THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXVII. No. 1969.] LONDON, FEBRUARY 5, 1901. [53RD YEAR. PRICE 6d.

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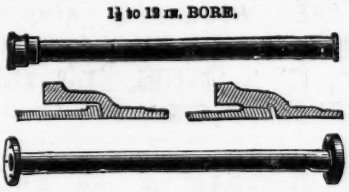

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At "The SHEFFIELD TELEGRAPH" Offices.

Reprinted from "The SHEFFIELD TELEGRAPH" June 27, 1900.

A SAVING IN FUEL OF £18 PER WEEK.

A couple of months ago when coal, which formerly cost us 8s. per ton rose to 12s. 6d., we read a lecture on the cost of steam production by John Holliday, in which the following paragraph appeared:—

Mr. Bryan Donkin, M.Inst.C.E., has published figures from some tests he carried out with different kinds of fuel in the same boiler, the conditions in all cases being the same; the results are comparable on the basis of the cost of fuel required to evaporate 1000 gallons.

Kind of Fuel.	Cost of Fuel per Ton.	Water Evaporated per Pound of Fuel.	Cost of Fuel per 1000 Gallons Evaporated.
	s. d.	lbs.	s. d.
A. Dust Coke	5 0	6	3 8
B. „ Welsh Coal . . .	10 0	8	5 3
C. Large „	22 0	9	10 11

Discovering that the Sheffield Gas Company made a considerable quantity of coke dust, which they gave away to builders and others, we entered into a contract for a supply for three years. Having a spare boiler, we had Meldrums' forced draught fitted, and soon discovered that coke dust made a very satisfactory fuel for steam raising. Our second boiler was then fitted, and we are now burning coke dust on the two almost exclusively. From an economical point of view, the experiment is very satisfactory, as will be seen from the following figures:—

Average week, Coal only, on One Boiler.

	£ s. d.
45 Tons at 12s. 6d.	28 2 6
Ashes at 2s., Seven Loads	14 0
	£28 16 6

Present Consumption on Two Boilers.

	£ s. d.
Six Tons of Coal at 9s. 3d.	2 15 6
Coke Dust	3 4 0
Two extra Stokers	2 12 0
Flues cleaning	10 0
Ashes, 12 Loads at 2s.	1 4 0
	£10 5 6

We shall be pleased to show the arrangement to anyone interested in the subject of the economical production of steam. There is no smoke from the chimney stack of the "Telegraph" Office, which is another good point in favour of coke dust as fuel.

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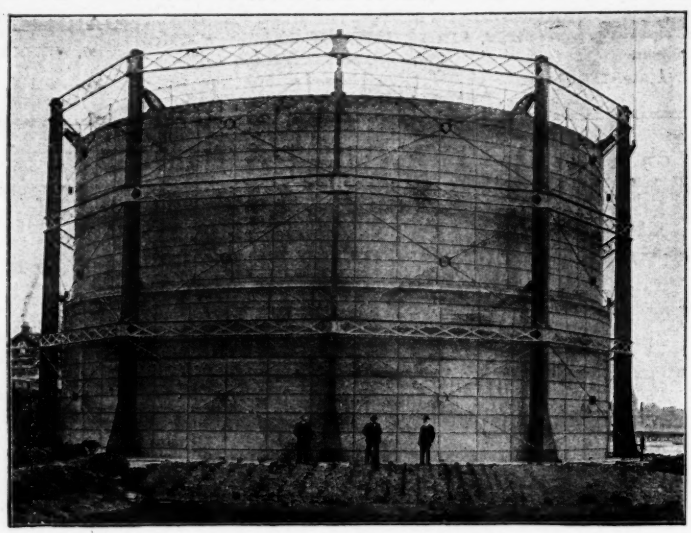

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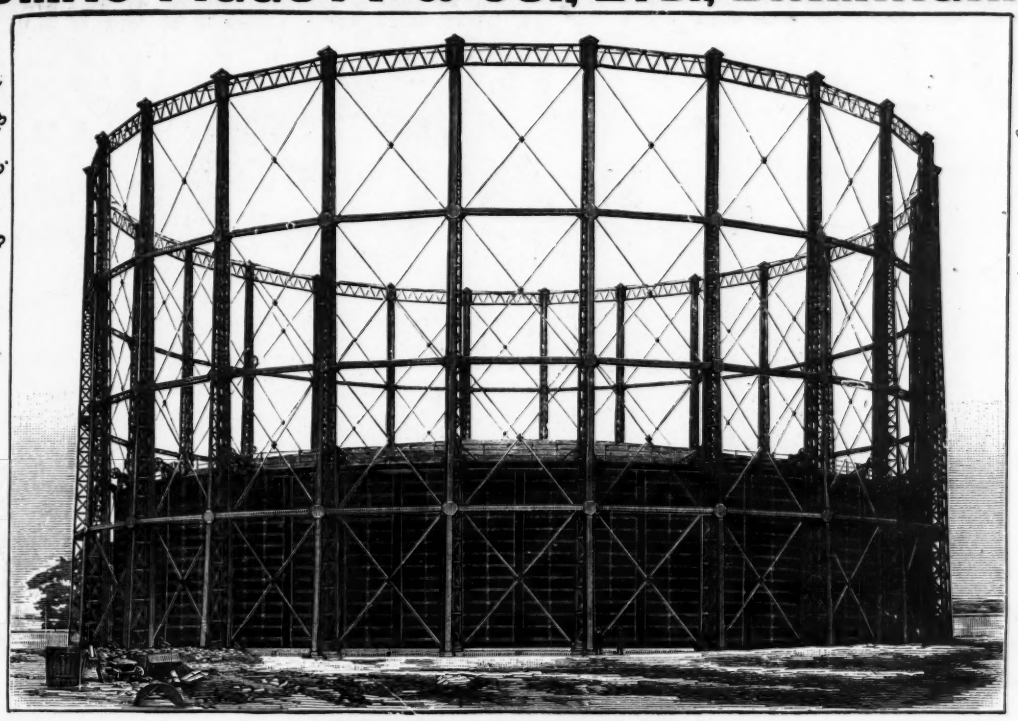

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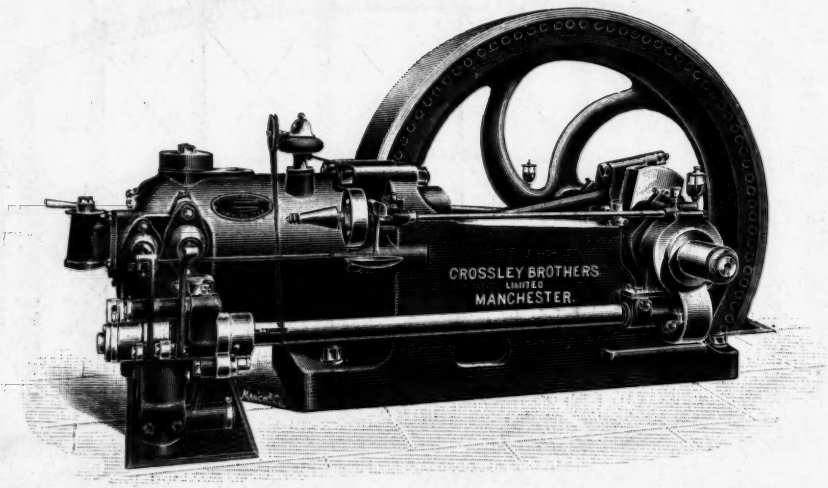

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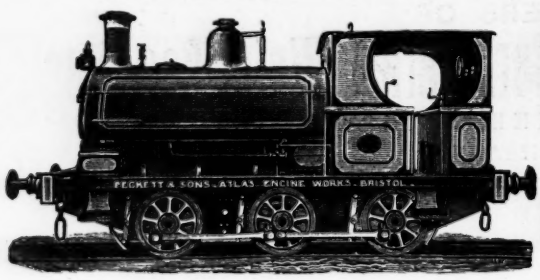

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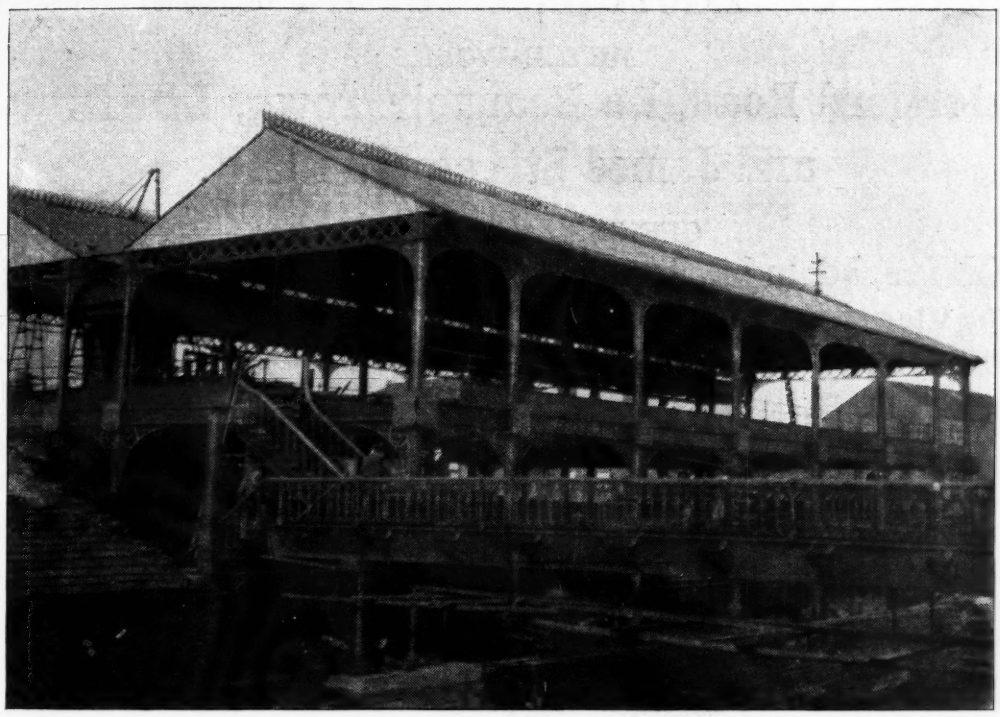

View of Purifier-House, 125 feet long by 79 feet wide.

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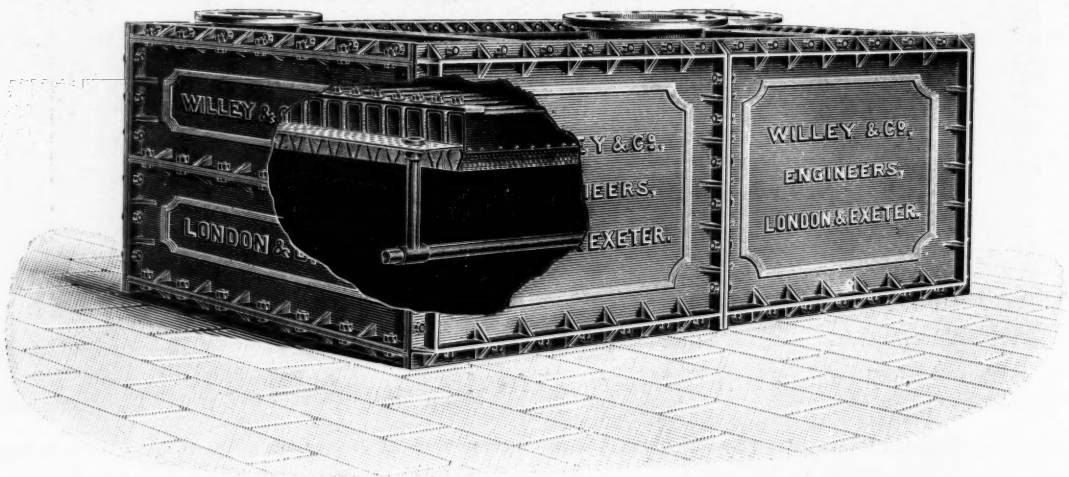

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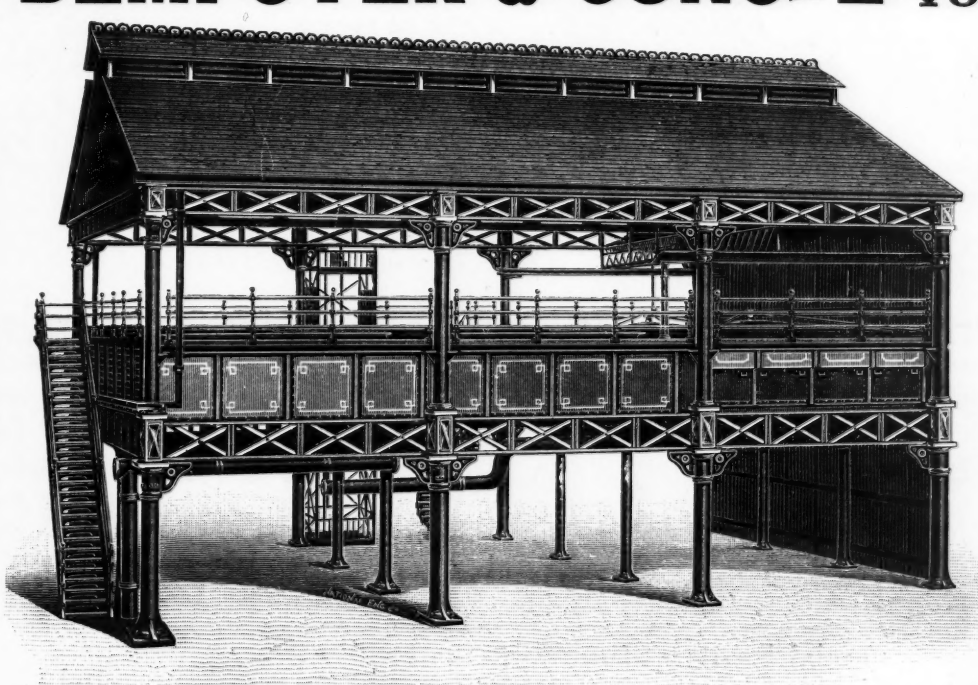

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View of Six Purifiers, Superstructure, Roof, &c., erected by R. Dempster & Sons, Ltd. (*From a Photo.*)

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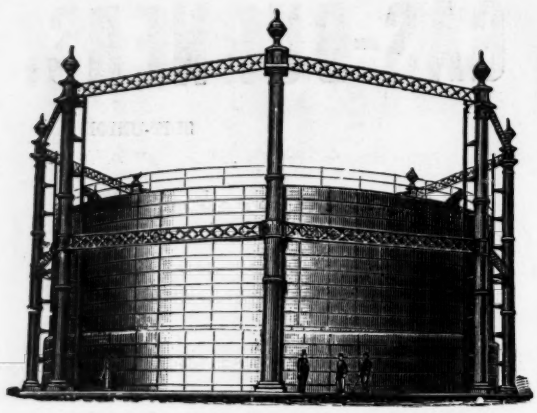

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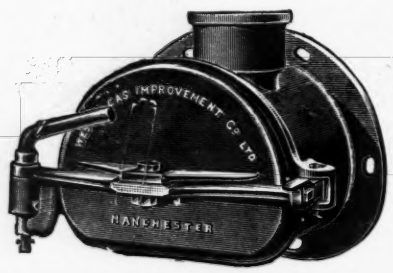

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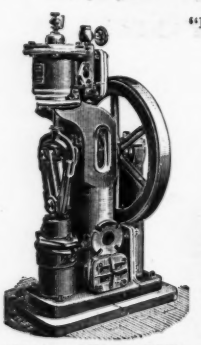

Fig. 705. "SINGLE RAM" STEAM-PUMP.

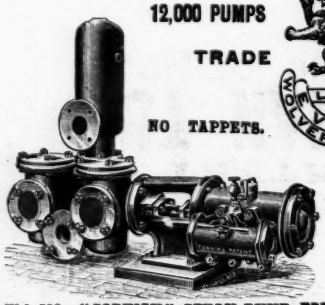

Fig. 696. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

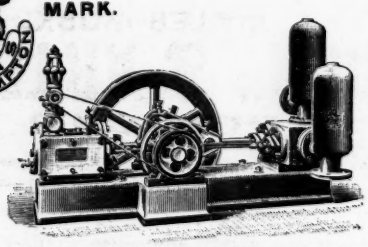

Fig. 688. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

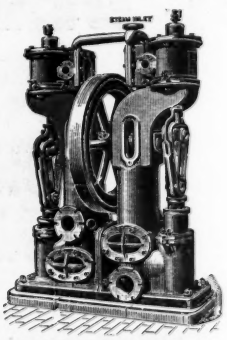

Fig. 713. "DOUBLE-RAM" STEAM-PUMP.

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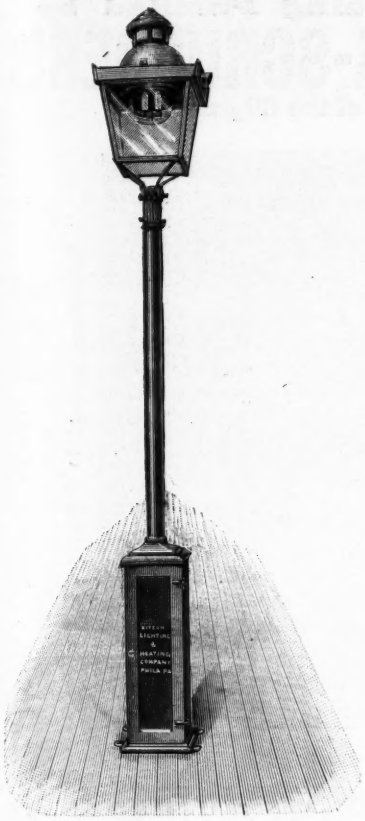

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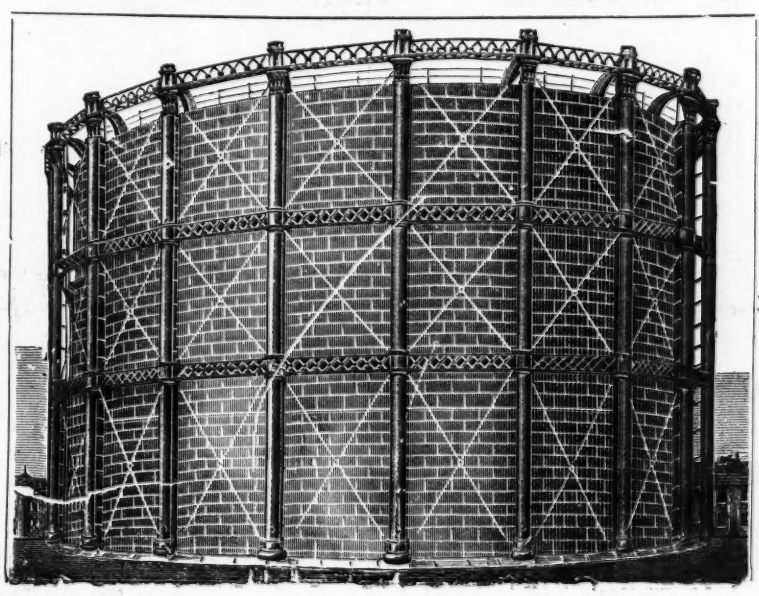

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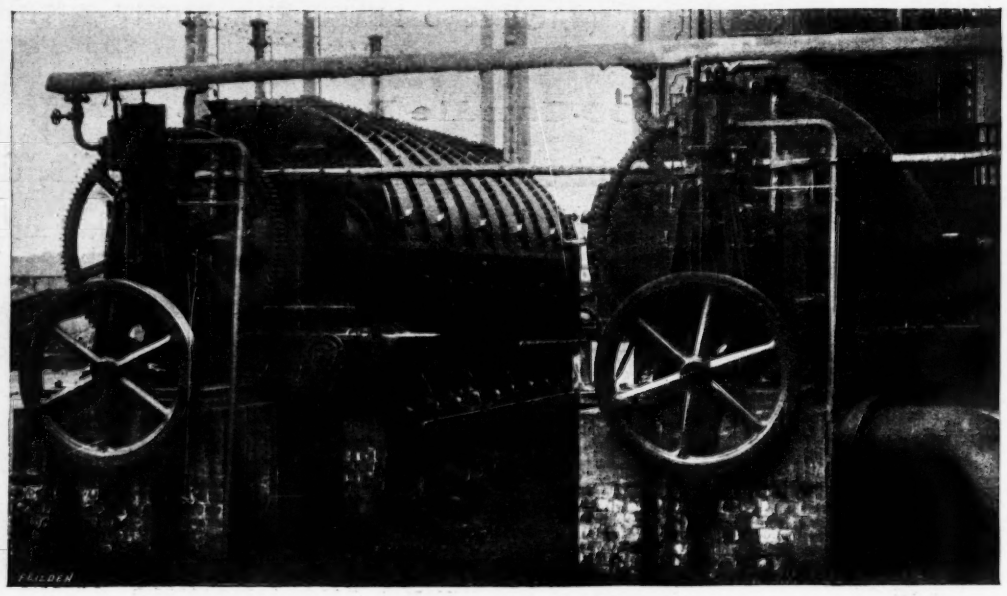

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PHOTO. OF MACHINES RECENTLY ERECTED AT THE SCULCOATES WORKS, HULL.

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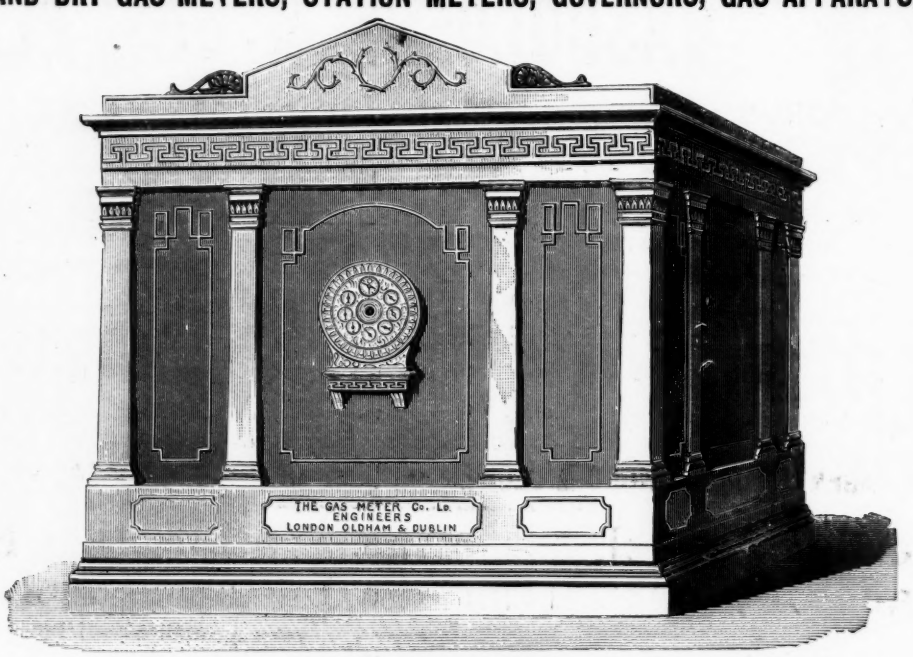

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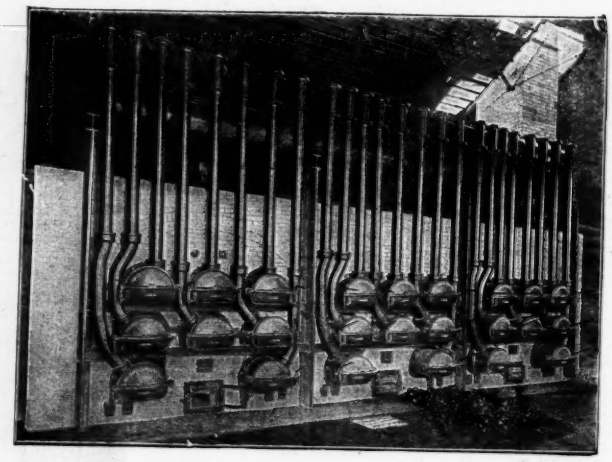

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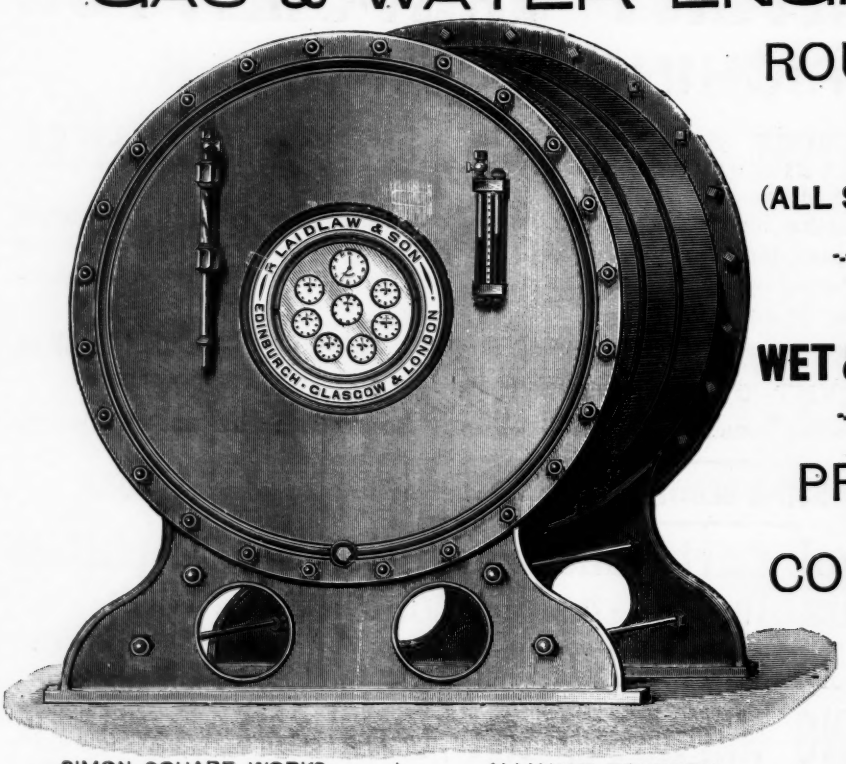

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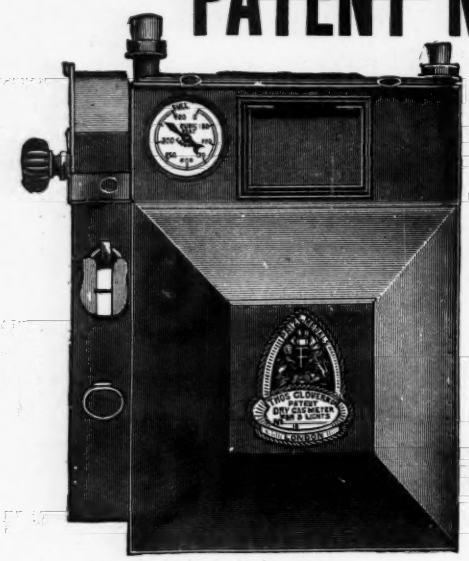

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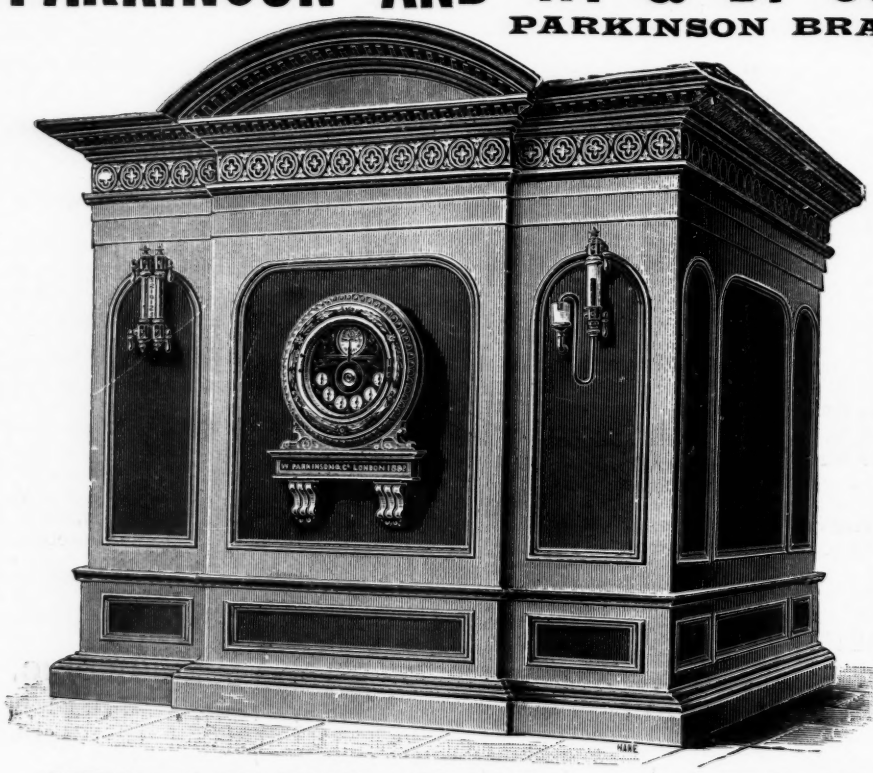

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

VOL. LXXVII., No. 1969.——TUESDAY, FEBRUARY 5, 1901.

EDITORIAL NOTES.

Report and Accounts of the Gaslight and Coke Company.

THE appearance of the accounts of the Gaslight and Coke Company for the past half year has been looked for with even more than the usual degree of interest, by reason of the continuance, without a shadow of relief, of the long-drawn-out crisis of the Company's fortunes. The last official disclosure of the position of the undertaking in the light of which Parliament will deal with the Company's third attempt to obtain powers for the raising of additional capital, is now before us. It is impossible to publicly comment on the accounts without feeling a strong sense of responsibility for uttering nothing that might in any way aggravate the difficulties of the Company's position. For all that the Governor, Colonel W. T. Makins, has on former occasions said in depreciation of the strictures made by "irresponsible "critics" of the Horseferry Road Administration, this sense of the opposite character of whatever observations of the kind have appeared on the authority of the "JOURNAL" has never been wanting. It does not require to be argued that the Gaslight and Coke Company must, for many reasons, be the cynosure of all the expert and general public intelligence of the day which is inspired with solicitude, in any sense, for the gas industry of the United Kingdom. It should furthermore not be necessary to point out that this curiosity in regard to the experiences and circumstances of the Company is impersonal. Not one individual in a hundred of those who follow the affairs of the largest gas-supply undertaking in the world, whose district is the richest and most important part of London, knows or cares who is personally responsible for the conduct of the Company's business. The facts speak for themselves, and are judged upon their merits.

This time, some of the facts are of peculiar interest. It has already been made known that the broad result of the half-year's working is a profit balance available for distribution of £551,753, out of which the Directors recommend the payment of a dividend on the ordinary stock at the statutory rate of £4 8s. per cent. per annum; carrying forward the sum of £221,570 to the credit of the current half year. For the corresponding period of the previous year, the balance was £560,664; and after the payment of a dividend at the rate of £4 18s. per cent., there remained £193,334 to the good. The quotation for the Company's 4 per cent. stock was at that time 108-110. Just a year later it was 98-100. The sum carried forward six months ago was £296,755, after paying the same rate of dividend as that now recommended. Then, however, the balance of profit on the revenue account was £628,018, whereas it now stands at £451,651. It takes £330,183 to pay the dividend recommended, and £196,652 to meet the prior charges; or £526,835 in all to be found for the payments on account of capital. This sum has, therefore, not been earned by £75,184. Put in another way, the net revenue for the half year amounts to £254,998, which would pay an earned dividend after the rate of only 3·36 per cent. per annum. This fairly bears out the comment made in our last week's Stock Market report, that an amount equal to £1 per cent. has had to be taken out of the balance in hand to make up the proposed dividend.

The second paragraph of the Directors' report claims a very satisfactory increase for the half year in the number of consumers, but admits a serious falling off, amounting to 6 per cent., in the sale of gas. This decrease is referred to the mildness of the weather, the extensive adoption of the incandescent system of burning gas, "and, in some measure, "to the necessary and temporary increase in the price of "gas." Has it not been observed, somewhere, that an advanced price of gas made no appreciable difference in the consumption? The report goes on to state that on the expenditure side of the revenue account there are two items which call for special notice—the high cost of coal, and the increased expenditure on wear and tear account. The former item is, in the circumstances, a matter of course; not so the latter. A charge for maintenance which jumps up from £178,977 to £218,149 seems to call for more explanation than is afforded in the bald statement that the extra cost is that of "reconstructional works now being carried out "at several of the Company's stations, which will produce "economy in working." What has been going on these twenty years past?

With regard to the recent dealings of the Directors with the Company's reserve of unissued capital, the explanation offered in the report is candid and to the point. The status of the Company, as a dividend-earning concern, was put a little too near par, at 4 per cent.; and inasmuch as the security actually stands at a discount, the remaining amount of ordinary stock cannot be legally issued. Next comes the reference to the deposited Bill; and, after reading it in connection with the pronouncements of the Board on the same matter for the previous two years, it is impossible to resist the impression that these official claims and statements do not hang well together. The policy of the Administration in this regard has been vacillating to a degree; and the latest scheme of legislation, differing as it does so remarkably from its precursors, will only tend to confirm the unbelievers in the capacity of the Horseferry Road to conduct the affairs of this great concern wisely and efficiently and with foresight in the interests of all the parties concerned.

Attention must be attracted to the capital expenditure in extension of works of £44,700 for the half year, in addition to the amount added to the wear and tear account for reconstructions, which are also new works. In view of the stagnation of the undertaking, inadequately accounted for in the report, many persons will incline to wonder where all this money is going—and whither the rest has gone, that has supplied the same items these many years. Under whose direction is this heavy expenditure going on, now that Mr. G. C. Trewby has retired—a detail not mentioned by the Directors? In the revenue account, not only has works maintenance been swelled in the manner already specified, but a sum of £27,821 has been taken on account of automatic meter supplies. Evidently, this is a costly branch of the Company's business. When next the consumers meet to protest against the dearness of the gas, it will behove the automatic prepayment division to keep quiet on the score of their surcharge, which cannot nearly place them on a parity with the ordinary consumers. Rates and taxes have gone up again; although the report claims that the result of the last quinquennial valuation has been somewhat in favour of the Company. In residuals, all the improvement is due to coke—tar and ammoniacal liquor having been a bad trade.

In the general balance-sheet, the most noteworthy entries are those showing, on the credit side, the larger stocks in hand at the end of the year as compared with the value of the stores a twelvemonth earlier; the progress made in reducing the balance of the automatic supplies fittings account, and the increase of the temporary loan to £475,000. It is rather remarkable that the usual formal notice endorsed on the printed accounts does not state when the dividend is to be payable. If this omission is due to an oversight, it is a curious one. Hitherto, for as many half years past as need be remembered, the dates on which the dividend warrants were to be posted to the proprietors, and were to become payable, have been plainly stated in the notice convening the meeting and signed by the Secretary and General Manager. Nothing of the kind appears on the present occasion, which will probably arouse inquiry on the point at the meeting. Surely it is not intended to hold over the payment of their dividends to the proprietors!

The Report and Accounts of the South Metropolitan Gas Company.

THE report of the Directors and the accounts of the South Metropolitan Gas Company have appeared, and will be found in another column. It cannot be said that the report is featureless, because the change wrought in the conditions of working of the undertaking by the great advance in coal would alone give a peculiar character to the statement. But, apart from this overshadowing consideration, there is

nothing of moment in the report. The excessive price of coal—"the highest since 1873"—is dealt with in an adequate manner. The Directors evidently had in mind the popular objection that was raised to the advance in the price of gas, on the score of the higher return to be expected from residuals; and they utilize the opportunity for explaining how the business of carbonizing has actually turned out. Other materials besides coal have gone up in value, with the broad result that the South Metropolitan expenditure on revenue account has risen from £651,915 to £890,287, or nearly a quarter of a million extra for the half year. To meet this additional expenditure, there has been an increase of £75,098 in coke; and tar and ammonia have also improved somewhat. But, notwithstanding these gains, which are distinctly lower than was to have been expected, there would have been a deficiency on the half-year's working of more than the whole amount of the dividend, but for the increase in price.

The corresponding sacrifices on behalf of the Company amount, in the first place, to a reduction of dividend by £19,796 for the half year, to which must be added £11,000 relinquished by the staff and workmen under the provisions of the profit-sharing scheme; and a deficiency of dividend of £9089, which must be taken from the Company's resources. The dividend recommended is 5 per cent. The report mentions the fact that the consumption of gas in the Company's district exhibits the very small increase of 1·8 per cent., which is attributed to the higher charge and the mildness of the early winter. The Directors confidently predict a reduction of price in June. An interesting point is the behaviour of the profit-sharing workmen, now that there is no profit for them to share. This is a state of things that is always, and naturally, regarded as constituting the touchstone of all arrangements of the kind. Profit-sharing is certain to work smoothly, say the critics, so long as there is money for the men in it; but are they going to share commensurately in a loss? That, of course, is impossible; but in the case of the South Metropolitan Company, the suspension of extra payment to the workmen on this account does not cut the arrangement short, nor extinguish the men's interest in the concern. Here is where the shareholding part of the scheme proves its merit.

The accounts show very explicitly the capital dispositions of the undertaking, and also indicate that the additional powers asked for in the pending Bill are not superfluous. The revenue account does not call for very much comment, though there are some striking figures. The advance in coal has already been mentioned. Purification shows considerable increase—from £17,810 to £27,555. Repairs are well kept up. Public lamps show an increase, probably due to the extensive renewal work under this head mentioned in the report. All the district Local Authorities, it appears, are being aided in the adoption of incandescent street lighting, together with the substitution of new lamp-columns and lanterns for old. Any gas companies who do not yet know the new South Metropolitan pattern lamp-standard, should repair the omission without delay, as it really is an ornament to any street. The number of automatic meters in use considerably exceeds the ordinary ones; and the dearer gas has not put out the fires. It would be interesting to learn why this Company have gained on tar and ammonia, while others have to complain of a falling off. The statement of stores in hand exhibits a wonderful difference as compared with the corresponding account for the previous year.

The Down Slide in the Coal Market.

Week after week in the early months of last year did we find the most engrossing subject of attention in the gas world to be that of coal supplies and prices. In these opening days of 1901 that subject again presents itself for comment week by week. But there the similarity in the situation ends. For, while last February the outlook was gloomy, and the position, well-nigh desperate, grew worse instead of better, now there is pleasure in contemplating a decidedly improved condition of affairs and a steadily brightening future. Last week we recorded a fall of 1s. in the quoted price of gas coal, which then stood at about 11s. 6d. per ton f.o.b. Tyne, and expressed the hope that gas companies would be chary of making contracts at that figure. Since then, the quoted price has still further fallen about 6d. to 9d. a ton; and sales are recorded at only a shade above 10s. f.o.b., though the price is nominally 10s. 9d. to 11s. 6d. In fact, as one report puts it, "prices are fairly on "the down grade." Small coal, which rose to such remarkable prices during the height of the "boom," has come down with a run; bunkers are more plentiful than they have been for a long time, the supply being considerably in excess of the demand; steam coal is lower; and, although heavy deliveries are being made, the gas coal trade is very quiet, and many of the collieries are accumulating stocks and would be glad of orders.

This is plainly indicated by the active competition that is being experienced by the coalowners in Lancashire, where trade is more active than in some other parts of the country; the result of the competition being that the Lancashire collieries have had to make considerable concessions to large consumers, who are not, however, showing undue haste to buy. Foreign customers are also reported to be sending fewer orders, which, in view of the fact that the coal crisis is past (as supplies are becoming more plentiful and prices are falling, in France, Belgium, and Germany), is more satisfactory than surprising. On the Continent, as in England, it is the slackness of the iron trade that is largely helping to bring about the easier condition of the coal market; an increasing output of coal being also an active factor.

The iron and steel trades in England and Scotland show no signs of revival—indeed, in the opinion of Sir Alfred Hickman, M.P., their prospects are extremely, almost unprecedentedly, gloomy. The output from the works is being steadily diminished, the number of furnaces in blast in the North of England being now lower than at any time since 1892. Yet stocks continue to increase, and orders are to seek. It is not, therefore, surprising to find that masters are asking their men to accept lower rates of wages, as prices have evidently to come down further in order to tap the stream of business afresh. In Cumberland, the masters are proposing a reduction of 25 per cent. in wages; and at one works, notices have been posted to the effect that if the reduction be not conceded the place will be closed—a fair indication of the depressed condition of the trade. Indeed, the only branch of the iron and steel industries that can be said to be active and prosperous is that engaged in the manufacture of armour plates and munitions of war—a business which, being strictly unproductive, and maintained at the expense of the Nation, can give at any time but a fictitious appearance of activity to trade.

These facts only go to confirm us in the opinion we ventured to express last week, that gas companies will be well advised to keep out of the market as long as they can, and not to buy their requirements for any considerable period unless they can obtain more favourable terms than those now on offer. The coalowners had it all their own way last year, and did not fail to make the utmost use of their opportunity. It is for those who manage the gas undertakings of this country to see that the tables are turned this year.

Mr. George Livesey on the Danger of Electrolysis.

The letter which appears in our "Correspondence" columns to-day, from Mr. George Livesey, further drives home the point of our last appeal to representatives of the gas interest for united action in face of the danger of the electrolysis of street-mains. It is always difficult for gas companies to act together; but the state of affairs threatened to be brought about by the Americanizing of British street tramways is so serious that no obstacles ought to be permitted to stand in the way of a complete agreement upon a defensive policy, if that be otherwise attainable. The Institution of Gas Engineers might arrange to hold a conference on the subject—a symposium open to anybody and everybody interested in the matter. Some competent and independent electrician—Professor Perry, for example—might be engaged to expound the science of the phenomenon; and then engineers could be trusted to grapple with the practical aspects of it. Here is the gist of the matter, as we at present apprehend it: British tramway companies and committees of municipal corporations are not merely hastening to adopt electric traction, but are doing so in close accordance with American methods. The process has been greatly retarded in many ways, much to the vexation of foreign touting and trading electricians in a hurry to snap up contracts before their British rivals were ready to beat them at their own game, if necessary. It would be odd, if it were not of a piece with the plentiful lack of wisdom in respect to industrial questions with which our newspapers are usually inspired, that scarcely had these formers of "public opinion" ceased from girding at the hideousness of the trolley wire, than they clamoured horribly for electric tramways everywhere "as "in America." Every magazine and review joined in the

reproach of "backwardness" sprung upon British tramway authorities, because the United States had thousands of miles of electric railroad to our unit mileage of the same means of transport.

Naturally, all this persistent advertisement of American methods told in the long run. Just as the great British public will buy any sort of rubbish that is only pushed upon it with sufficient importunity, so the trolley-wire tramway was taken on the recommendation of its friends. In their great hurry to be popular, as Mr. Wordingham testifies, many tramway owners sent their orders to America, thus unintentionally helping to inflate a later journalistic bubble. Meanwhile, the Board of Trade undertook to look after the question of electrolysis, which American street railway companies had cheerfully ignored. This matter, of course, is not one that the popular mind is likely to trouble itself about. Only, if a gas-pipe were in consequence to get itself perforated, and a family were to be suffocated or blown up, the newspapers would raise a great hubbub over the criminal negligence of the responsible parties. The Board of Trade seem to be perfectly contented with their way of dealing with the risk of electrolysis; so is not Mr. Livesey, who is advised that the official regulations are of no avail. We sufficiently explained the nature of the trouble a fortnight ago, and have nothing to add to the statement. Mr. Livesey's present appeal is mainly for evidence of actual injury to pipes by electrolysis. There should be no lack of this, even now, when the mischief has been done by electric lighting currents alone. One service-pipe perforated by this agency will impress a Parliamentary Committee more than any amount of sworn testimony as to the possibility of such destruction. Parliament has little sympathy with vested interests which cry out before they are hurt; but it pays the most serious attention to them when they can show that their complaint is inspired by vigilant regard for the public safety. It is for Gas Companies (and Water Companies, too) to prove the reality of the danger; the electricians must charge themselves with finding the measures of prevention.

Coal Miners and their Policy.

THE proceedings at the annual conference of the South Wales Miners' Federation, which opened at Cardiff yesterday week, do not give much encouragement to those who hope for peace in the Welsh and other coalfields in the future. The President's Address, while calling special attention to the phenomenally high wages enjoyed by the members of the Federation during last year and at the present time—wages which the sliding-scale and not the Federation was instrumental in obtaining—said not a word to prepare the men for the inevitable reduction in their wages which the present year has in store for them, not a word to call attention to the obvious reaction in the trade. A leader worthy of the name, and desiring peace in the industry, would surely have done his utmost to reconcile the men in advance to the alteration in their circumstances which, although it will not be experienced just yet, owing to the influence of contracts on the average price obtained, is certain to come in the not distant future.

Instead of any such wise counsel, however, we find the greater part of the address occupied by the advocacy of a policy having as its object the return to Parliament, and permanent maintenance there, of "between fifty and sixty" members drawn from the ranks of the Miners' Federation of Great Britain, and elected solely to promote the particular interests of the Federation. In order to carry out this grandiose policy, all that the Federation officials appear to think necessary is to provide the funds, which they propose to do by means of the annual subscription of 1s. by each member. How they are going to induce fifty or sixty constituencies to subordinate all national and other local interests to those of the coal miner is not explained. The Nation will indeed have come to a pretty pass when such a thing becomes possible. Indeed, we have too high an opinion of the common sense and patriotism of the miners themselves to believe that, even were such a policy practicable, they would consent to place their broader interests as citizens and as Britons in the hands of men whose sole qualification for election would be their knowledge of coal mining technicalities and Trade Union politics.

The proposal is a childish and absurd one; its object impossible to achieve. Were it possible, moreover, the policy would be unnecessary; for, if the miners constitute the majority in the number of constituencies specified, are they not already represented by that number of members, who would not dare oppose their declared wishes? If they have not the necessary numerical superiority, how are they going to elect their own nominees? The suggestion is to be balloted upon by the Federation members in the course of the present month. It will be interesting to see how far it is accepted, and by how many the stupidity of subscribing £15,000 a year for such a purpose is perceived.

The only other matter discussed at the conference that calls for present notice is the question of the eight-hour day. In his address, the President, Mr. W. Abraham, M.P., declared that the Federation would proceed as vigorously as ever with the Miners' Eight Hours Bill, and would not rest until it became law. This declaration was doubtless inevitable; but the Vice-President, Mr. W. Brace, went much further. He called attention to a proposal on the *agenda* that the members should be balloted on the Eight-Hours Question, and went on to remark that, on occasions when the Bill had been before Parliament, politicians had told them that the miners had the power to enforce the shorter day through their Trade Unions. "The miners would now "accept that challenge," proceeded Mr. Brace, "and let it "not be complained against them if that course resulted in "a great stoppage of work throughout the entire coalfields "of Great Britain."

It remains to be seen whether the threat was meant seriously, and represented the considered policy of the whole Miners' Federation, or whether it was only in the nature of "bluff," uttered by an individual without authority. But, taken as it stands, it makes ugly reading. It would, moreover, be not out of keeping with the past history of the coal trade were a general strike in favour of restricting the output and enhancing the cost of production to be precipitated at a time when the industries of the Nation are crying aloud for cheaper coal, and plenty of it, to enable them to maintain their position in the world's markets. So true it is that the working man in this country is, generally speaking, only sufficiently educated to enable him to articulate his ignorance of his own ultimate and true interests, and to read the writings and the reported sayings of those who foster that ignorance. That true friend of the workers, the Rev. F. Denison Maurice, once eloquently inveighed against newspapers conducted in the interests of working men only; and we truly believe that many of the publications that devote themselves to those "interests" are among the very worst enemies of the working classes. He is not a friend who flatters another to his hurt; and how often does the working man's newspaper tell him when he is making a fool of himself?

In Memory of Mr. Denny Lane.

IT is with much quiet satisfaction that those who deserve to be recognized as the "old stagers" of the gas industry will hear that our contemporary the "Electrician" remembers the late Mr. Denny Lane, of Cork, in criticizing Mr. H. A. Humphrey's "Mond Gas" paper, read at the Institution of Mechanical Engineers. Gas engineers are not likely to forget the masterly demonstration, by Mr. Denny Lane, of the carrying capacity for power of a 6-inch main conveying common coal gas at low pressure. Out of regard to the memory of one of the cleverest and best-hearted men who ever cast in their lot with the gas industry, we desire to remind our readers that Mr. Lane's original suggestion, explained by himself in a contribution to the "Electrician"—after the idea had been discussed in various quarters—was reproduced in the "JOURNAL" for Oct. 20, 1891, p. 711. He further elaborated his views in his Inaugural Address as President of the Gas Institute in 1893. It will be found a pleasant exercise to read up again these compositions (in which the lambent wit of the author incessantly played round the heaviest technicalities), and compare them with later lucubrations of the same order. The advantage will not often be found to have left the older guide.

As the "Electrician" justly says, Mr. Lane demonstrated the capabilities of mains for conveying potential power in the form of common coal gas—what we should describe now as 600-unit gas—which is "the very *extractum carnis*, "as it were, of the fuel." This is a very different thing from arguing that the same result follows for any grade of fuel gas. As regards the suggestion that the superior thermal efficiency of gas-engines rings the knell of steam-power stations, it is well remarked that this does not follow The end of the steam-engine is not yet. Gas-engines, driven by producer gas of some description, will probably come into

more general use for many purposes; but a really large gas-power generating station, with the necessary producers, would be an intolerable nuisance in a residential neighbourhood. To remove them to the colliery districts, raises at once the question of power transmission; and so the vicious circle begins again. There is no general solution to the problem that can be relied upon to carry conviction to the untechnical person, though there are, of course, some factors of universal applicability which must go to the determination of every hypothetical case.

Popular Science (?) and Gas-Stoves.

It is pretty bad when gas-bath water-heaters are shut up in unventilated box-rooms, converted for convenience' sake into bath-rooms, at the instigation of people who do not pretend to be able to offer a competent opinion on the hygiene of the dwelling-house. But it is infinitely worse when a writer in a self-styled "high-class" weekly journal abuses his privilege in order to puff a trade article, such as a gas heating-stove, in terms which might be construed to make him an "acces-"sory before the fact" of a case of asphyxiation. We are not going to name the publication, nor the subject of the puffing notice, but will merely repeat that the writer states that he has discovered a new gas-stove which "is constructed "on a different principle from any other gas-stove yet in-"vented." This ought to be true, if, as is subsequently stated, "no flue is required for conveying away the products "of combustion, for the very sufficient reason that there are "no such products; combustion being perfect." So that is all right. This wonderful feature of burning without making any products of combustion is not the only virtue of the apparatus in question. It does not "exhaust the air" of the room in which it is used, nor "rob it of that moisture which "makes it healthy for us humans." The secret of this success is declared to lie in the mixing of 45 per cent. of air with the gas burnt, which air is in some remarkable way unaffected by the operation. Not only does it retain its "natural mois-"ture," but it becomes "diffused through the room in a way "that pleasantly warms it in a perfectly harmless manner." In effect, the air keeps its character, under these conditions, as staunchly as the fool of old time kept his folly—even though brayed in a mortar. That is the kind of person likely to be generally useful on the editorial staff of a "Society" journal. But where is that Schoolmaster who has been "abroad" so long?

WATER AFFAIRS.

Water and Sewerage in Paris.

Strong as is the feeling occasionally displayed—mostly with as little justification as in the case alluded to in the last issue of the "Journal"—towards the London Water Companies, it is mild in comparison with the outcry which has lately been raised against the officials who control the water supply of Paris. Epidemics of typhoid fever in various quarters have increased to a serious extent, and the cause has been traced to the contaminated condition of what are generally regarded as the purest sources. Under promise of providing the citizens with a supply of drinking water which would be absolutely unimpeachable on the score of quality, extra taxes were imposed, which have been paid perhaps rather less grudgingly than are fiscal impositions generally, because it was felt that good value would be obtained for the money. With these epidemics breaking out, however, the taxpayers are beginning to think they have been deceived; and the Municipality have been called upon to deal frankly with them, and fully explain the position. "Le Matin" has been leading a crusade against the responsible officials on this question; and, in the course of a final attack upon them in a recent issue, the writer of the articles claims the merit of having forced the Senate and the Chamber to take action, and place the water service under totally independent control. A Commission has been formed to exercise strict supervision over the supply of water and the engineering work connected therewith, and one of their first decisions has been to secure protecting zones, having an area of something like sixty miles, round the various sources of supply, and place them under constant and rigorous supervision. In addition to this, the entire course of the water till its arrival in Paris is to be protected, so that it shall reach the city as free as possible from contamination; but before it arrives there it is to undergo filtration. Of course, Seine water cannot be entirely dispensed with; but its employment is restricted, as a rule, to industrial purposes, street watering, sewer flushing, and the extinction of fires. It has to be used occasionally, however, for mixing with the spring water when this runs short; and according to "Le Matin" the supply is taken at the very outlet of a sewer. This is where the source of all the trouble comes in.

The General Council of the Seine are, however, setting to work to remedy this serious evil. We learn from the "Engineer" that they have prepared a large sewerage scheme which will have the effect of purifying the river both above and below Paris, at an estimated cost of 4,000,000 frs. It is divided into three sections, the first of which provides for the construction of four elevating stations capable of dealing with about 33½ million gallons of sewage daily, including 14½ millions from Paris; the second, for collecting about this quantity below the city, and pumping it by two stations into the general Paris main; and the third, for dealing with St. Ouen and the communes between the plateau of Romanville and St. Denis. The second section of the scheme has already been put in hand. The General Council hoped to obtain some financial assistance from the State in carrying out this important work, on the ground that it now possesses two collectors, which have been constructed at a cost of 3,000,000 frs., for conveying the sewerage which previously flowed into the Seine between the fortifications and Suresnes to a point below the barrage of this town. The Minister of Public Works, however, reminded the Council of the fact that, according to law, the State are exempt from granting subsidies for sanitary undertakings. At the same time he offered to transfer the collectors, and to capitalize into a lump sum of 700,000 frs. the amount annually paid by the State for cleaning them, in order to provide the Council with money for carrying out the work. As no better terms could be obtained, the offer was accepted. The cost of this part of the scheme is 2,505,000 frs., two-thirds of which will be borne by the communes on whose behalf it is being executed. When the entire work is complete, other measures are expected to follow. It may be hoped, therefore, that the combined efforts of the two bodies named above will eventually render Paris less susceptible to epidemics of the class which have lately aroused so much feeling among the citizens.

Two Legal Points.

In our "Legal Intelligence" to-day will be found reports of two cases which present points of general interest to which attention may be usefully directed. The first came before a Divisional Court last Thursday, and raised a question as to what constitutes "beneficial occupation" of land for assessment purposes. The East London Water Company are the owners of the site of a disused reservoir, which they are desirous of utilizing for building purposes. With this view, they authorized a firm of railway contractors to deposit upon it the spoil which came from works they were carrying out. The Overseers of St. Mary, Stratford, under the Valuation (Metropolis) Act, 1869, sought to have the Company placed upon the rate-books in respect of this land, on the ground that they were in beneficial occupation; and the local Justices supported them, but stated a case for the opinion of the Superior Court. Justice Wills granted the appeal; pointing out that though the Company were owners of the property, the only acts which could indicate occupation were those done by the railway contractors. He thought this was sufficient to decide the case. Justice Phillimore concurred with his learned brother; but they agreed to allow an appeal.

The other case came before the Bradford Magistrates, and raised the question of the liability of a consumer for the water used to put out a fire upon his premises. The fire occurred on Dec. 23, 1899, at the factory of Messrs. Rouse and Co., a firm of cotton spinners in Bradford, who were supplied with water by meter by the Corporation. In extinguishing it, the firm's hydrants as well as the public ones were brought into use; and at the end of the quarter the Corporation sent in a claim for £79 14s. 10d. for 2½ million gallons of water, and then supported it by the contention that all the water passing through the meter should be paid for by the consumer, irrespective of the purpose for which it was used. They acknowledged, however, that if the water in question had been drawn from the mains direct, no charge would have been made for it. The simple answer to the claim was that the defendants were not liable for the full amount charged, inasmuch as the water had not been used solely by them, but by the servants of the Corporation

also. They were willing to pay a sum based on the average of the three preceding corresponding quarters, which worked out to £32, and had actually tendered £33 10s. in settlement. The Stipendiary Magistrate (Mr. C. Skidmore) took time to consider his judgment, which he gave on Thursday in favour of the defendants. He held that, as the water was not used by them for the purposes of their business, but for extinguishing a fire which might have been dangerous to the public, it would be both unjust and unlawful to make them liable for it. He therefore ordered them to pay the amount originally tendered, but expressed his willingness to state a case. As this was a test action, an early attempt will doubtless be made to upset the decision; and we shall await with interest the next step in the proceedings, without venturing to speculate upon the probable result.

ESSAYS AND REVIEWS.

THE PROSPECTS OF GAS-FIRES.

It is gratifying to note the interest excited in readers of the "Journal" by our observations on the actual condition and prospects of gas heating, with special reference to the standard of commercial gas-fire design and construction. There is a good deal more to be said about gas-fires, from different points of view, before the subject can be regarded as sufficiently discussed. We should like to hear from other manufacturers besides Mr. Thos. Fletcher, but would prefer their treating the subject frankly from the trade standpoint. It would be both valuable and interesting if representative makers would contribute figures, not estimates, from which it might be ascertained what is approximately the volume of this trade, and what is the character of the articles most in demand. We should much like to hear from gas managers on the general question, especially on the important point of the connection between the successful working of gas-fires and the maintenance of a good pressure in the mains throughout the twenty-four hours. At present, it is complained that in many places the practice of considerably reducing the gas pressure after 11 o'clock, or at midnight, is the source of much trouble with gas-fires in sick-rooms. The common gas-fire, like the incandescent gas-burner, is not a low-pressure apparatus; and the question of how far its susceptibilities in this respect are to be respected at the gas-works is not an unimportant one.

The letters we published last week from Mr. Ulick John Burke and Mr. W. H. Sherburn really converge upon one and the same point, which is the desirability of putting the winter heating of dwelling houses upon a better footing, and of making gas useful in this way. Truly, a most desirable consummation. Mr. Fletcher would say in a moment that he did it many years ago, which is true. All the particulars are on record. The example in the same kind of enterprise of the late Dr. Lawson Tait, of Birmingham, is so familiar as to be a commonplace. Then, why does not the practice spread? Can any correspondent throw light upon the reason for this backwardness? We venture to ascribe it, in the first place at any rate, to the glaring lack of improvement in the ordinary run of house building, of which mention has already been made in our columns. This sterility of invention seems to curse the domestic architecture of this country and era from top to bottom. From the speculative builder's "eligible villa residence" on a suburban estate, to the fashionable West End "flat," scarcely one new home in a thousand shows the smallest evidence of intelligent appreciation of the conditions of modern town life. We are aware that the architectural profession, in London at least, have confessed their inability to touch the class of work done by the speculative builder—that is to say, their art is a sealed fountain for the great multitude of people whose circumstances compel them to inhabit houses rented at from £25 to £100 per annum. Whether or not, this is a wholesome state of things, we prefer the architectural profession to say.

Talk to one of the hard-working, hard-headed men who are engaged in providing houses "for the market"—that is, separate dwellings rented at not exceeding £60 per annum—about the desirability of making this class of house property easier to live in, in view of the difficulty of obtaining efficient domestic servants, and he will candidly confess that his customers do not encourage him to attempt anything of the kind. Houses have to be turned out to a familiar pattern; and the experienced house-hunter knows precisely what to expect for the £40 a year he is prepared to pay. A little more stained glass, a cunningly-shaped hall window, an extra cupboard on an upper landing will let a house much quicker than a good hot-water service. The former things catch the eye, and pay the builder. Unfortunately, the veneer of æstheticism that has become spread of late years over young persons who have a bowing acquaintance with the Fine Arts, tends to turn their thoughts away from the really essential, and attach them to the merely fanciful elements of house building and arrangement. People will pay for these tricks of the builder's trade, and never think of how they are sacrificing the substance of a healthy and comfortable home for the shadow of prettiness—which, by the way, is only to be seen from outside. Thus both the experienced house hunter and the newly-married couples with "taste," conspire to confine the speculative builder to a rule of soulless uniformity of pattern, or to that of meretricious eccentricity of arrangement and external finish.

Nor is it usually possible to get anything really better by paying for it. Take the case of a would-be householder who has means and a desire to build himself a house to order. To build a single house to a particular design costs half as much again as the ready-made article; and there is no advantage in it whatever. All the materials and scantlings will be the same; and the accommodation will probably be less than in the house which has to compete in the open market. If the would-be householder who desires to "suit himself," asks his architect, or trusty builder, how to build for the saving of domestic labour and so as to take the fullest advantage of the latest facilities of civilization, what sort of reply will he receive?

The shortcoming of architects and builders becomes even more glaring when one considers their performances in the rebuilding of London with "mansions," divided into "flats." There lies before us as we write a pamphlet giving the particulars of the very latest architectural triumph of this description, which was recently "opened" with high municipal honours. It is a new street "lined on both sides with blocks of residential flats, most of which are completed. The blocks differ from each other both in plan and in design, and have large entrance courtyards. The designs are based upon classic forms, and the monotony of continuous rows of buildings has been avoided." The architect, we learn, has felicitated himself in public upon having had the opportunity of designing "a whole street" in the Metropolis; and the criticism we are most inclined to offer on his performance is that he has forgotten the interiors in the exteriors. Monotony of external appearance has indeed been avoided, but at a heavy price. For while the thoroughfare is bordered by monumental-looking piles, the suites of apartments enclosed by the massive brickwork are no improvement upon those provided in semi-detached suburban "villa residences" letting at £38 a year. For these flats, from £135 to £170 a year is asked. When we say these expensively-rented suites are no improvement on the ordinary suburban villa, we mean that they do not give more elbow-room or airiness, the internal finish is no better, and the "offices" are of the same character, only more cramped. No attempt is made to realize any of the possibilities of close packing, such as steam heating or the lightening in any way of the burden of independent domestic service; and the gas "points" in the different rooms are as poorly disposed as usual. It is difficult to believe that the better housing of the London population, beginning with those people to whom "money is no object in comparison with a comfortable home," can be effected in this heedless way.

In this same connection, it may be mentioned that a paper on "Flats" has been read by Mr. E. T. Hall before the Architectural Association, and is reported *in extenso* in the "Builder" for the 26th ult. The paper, the work of an acknowledged authority on the subject, is well worth attentive perusal. It gives a bird's-eye view of the "flat" system, as followed in Vienna, Paris, and London. As might be supposed, the author easily proves the superiority of the London article in regard to sanitation, the sanitary sensibility of the most advanced Continental peoples being as yet scarcely more than rudimentary. Speaking of fire-proof flooring, Mr. Hall remarked upon the convenience and cheapness of the rolled steel joist and coke-breeze cement concrete floor. The soffit of the concrete is to be brought an inch or two below the joists, to protect the steel from the direct effect of fire. He disapproves of nailing floor boards to this concrete, on account of dry rot; and states that in recent buildings he has dispensed with the boards, finished off the concrete with a rendering of cement, and covered this with linoleum direct. This gives at once a furnished appearance to the floor, and rugs and carpets look well upon it. The result is pleasant to the tread, it is not so resonant as wood, and vermin cannot harbour in it. How long will it be before this example is copied?

The discussion on Mr. Hall's paper, which was beautifully illustrated, brought out many extremely interesting points. Dr. J. F. Sykes, speaking as a sanitarian, remarked upon the smoky chimneys and stuffy rooms usually met with in flats, which would be a difficult matter for architects to deal with. Indeed, if there is too little ventilation in ordinary dwelling houses, in the case of flats the matter is a great deal worse. It scarcely seems probable, therefore, that the health of a large town would be improved by housing the mass of the people in this way. As regards the smoky chimneys, here it would seem should be the opportunity for gas heating. Willing testimony on this side was uttered by Mr. C. J. C. Pawley, who gave it as his opinion that "gas-fires would be the fires of the future for flats, especially in drawing rooms." Here appears to be the best solution of the problem of living in town for that numerous class of people who have no small children, and do not wish to be troubled with servants of their own. Obviously, gas cooking and gas heating are indicated as convenient means of doing the work of such establishments. The attention of architects should be directed to these matters, and not wholly wrapped up in contemplation of the importance of elevations. And at the same time, to make better provision for the still larger proportion of English people engaged in towns who must live in their own independent suburban houses, it should not be beneath the attention of architects, sanitarians, and the more enterprising builders to try and improve the cheapest buildings of the kind in the essential matters of systematic warming and ventilation.

AMERICAN ENGINEERING COMPETITION.

[Second Article.]

In the preceding article, it was shown that American competition has already been felt severely in many industrial circles at home, besides having made considerable inroads into our foreign and colonial markets; and that it has had in this country the direct and immediate effect of precipitating a depression in the iron and steel trades, and, thereby, of hastening the break in the price of coal. With the presence of this unprecedented competitor in the world's markets, our manufacturers have in future to reckon. They have to ensure the full efficiency of both management and labour in their establishments, in order successfully to cope with that competition; and the question to be considered is whether they—and all engaged in managing large industrial undertakings—have anything to learn from the Yankee in regard to commercial and manufacturing methods, and works management.

We have said a good deal in previous articles as to American commercial and manufacturing practice. What we more especially wish to consider now is the subject of efficiency in management. There can be no question that American business undertakings are run on the most modern business lines by the most capable and enterprising men that can be obtained. We do not hesitate to say—speaking not particularly of engineering enterprises, but generally—that many English undertakings are run on old-fashioned, "respectable," but out-of-date lines, by worthy but slow-going individuals. Now it cannot be contended that we have not the very best of material in this country out of which to produce fully efficient business men. Neither, it may be added, can it be contended that we have not the very best material out of which to fashion the most efficient soldiers in the world. But the question for the Nation in regard to both the Arts of Peace and of War is how to make what we admittedly need out of the material we have admittedly got. With Army reform we have no concern in these columns; but in the question of training commercial recruits, more especially for the commissioned ranks, we are much interested.

Why, then, is the American business manager frequently a more capable and enterprising individual than the English? To this question "The Times" Correspondent supplies an answer which emphasizes the point we made some while since, and which has been contested by the writer of the articles which appeared in the final numbers of the "Journal" for last year on the "Future of the Gas Profession"—namely, the need of using young men. "The consideration shown to youth," "The Times" Correspondent writes (in a most interesting paper on "Educational Influences in American Engineering Progress"), is, apart from physical resources, "the mainspring of American enterprise." He proceeds: "Mr. Lecky has said, in the introduction to 'Democracy and Liberty,' 'The respect for old age is one of the strongest of English instincts, and is often carried so far that it will be found that men only attain their maximum of influence at a time when their faculties are manifestly declining.' The truth of this is strongly brought home to an Englishman on first visiting the United States. There one finds young men at the head of affairs everywhere. The great Carnegie steel-works, which made a profit of between 40 and 42 million dollars in one year, affords an example—one among many. Those who meet the founder of the Company see a man full of vitality, but who has retired from the active management of the business at an age when many in this country look forward to years of control. The acting President is a young man, who was apparently not much above 30 years of age when he was appointed. There are three principal steel works owned by the Company, each controlled by Superintendents equally young. In the whole course of my last trip to the United States, when I made the matter one of close observation, I can remember only two instances of elderly men taking the leading part in the management of works. . . . The Americans go on the principle that youth is the season of energy. As a man advances in life he has less to hope; something has gone out of him. He ventures less and wins less. In this country, we are over-cautious; and, though our caution may avoid mistakes, it loses more good chances."

We have made this lengthy quotation because we feel that the question—which, like every other, has two or more sides to it—is one worthy of very careful consideration by those responsible for the appointment of managers and other chief officials of large business concerns. We are not going to extol youth at the expense of age, without reserve; but there can be little doubt that many a business in this country is languishing because the young men employed in it are given no opportunity to exercise their energy, their powers of initiative, and their fresher minds. The young man, it is true, has not the experience of the old; but much of the valuable experience of the older man, be it remembered, is only acquired, can only be acquired, after he has attained the position in which that experience is of value. And the young man would probably learn more quickly, and profit more fully from his experiences, than the older man. One does not expect the child to be able to swim the first time he is taken into water. But he never will be able to swim at all until he is; and the later in life he begins to learn, the poorer the hand at swimming he is likely to make.

So in business. The most promising young men must be picked out, given responsible work to do—given scope for all their abilities and energies while they are in the full, fresh possession of them, not kept at stultifying, deadening, uninteresting routine until they are too thickly crusted with the barnacles of tradition and precedent to move swiftly when their chance at length arrives. But we do not advocate the sort of wholesale throwing on to the human scrap-heap of the elderly that "The Times" correspondent would lead us to believe is practised in the United States. Many a man is full of life and energy—sometimes of initiative and enterprise—at 60 years of age; and it would be wanton folly to discard him. But that does not affect our contention in the least, it rather strengthens it; for it will be almost invariably found that such an one has been employed to the full extent of his ability from his youth up—that he was given his opportunity young, and was not misused on inferior work until past the prime of life. Armstrong, Gladstone, Bessemer, Siemens, George Livesey—one could extend the list at will. Nobody would suggest that younger men should have replaced any of them when they had passed the half-century or further. But they were all in the first rank early in life.

If, however, we are going to get full value out of our young men, we have to do something more than make better use of the best of them; and that is, educate them more efficiently and, further still and even more important, imbue them earlier with a sense of the value of knowledge, and with a desire to make themselves fitted for the career they are to pursue. It is, we know, dangerous to touch upon the question of sports in this connection, for that is to run the risk of being misunderstood as decrying the value of manly outdoor games, the love of which, as a matter of fact, we rate as a priceless blessing to the English race. But it must be said that a sense of proportion, and of the fitness of things, is often lacking in the rising generation of to-day; so that sports not only fill the leisure hours, but distract attention from business in working hours, and are deemed of more importance than the work of life. For this our schools are partly, and parents are largely, to blame.

In the United States, the opposite extreme is reached. The picture drawn by "The Times" Correspondent is very interesting, even though we be not anxious to have it exactly reproduced in this country. He writes: "That the young men in the United States successfully fill positions for which we consider matured experience a first essential, is due, no doubt, to a variety of causes, the first of which is to be found in the early treatment of children. I have sometimes been almost led to think there are no children in America, only some immature men and women. . . . It is customary for fathers to discuss their business affairs with their sons in a way that is quite surprising to an Englishman. These apparently small causes have a far-reaching effect. The youth, when he leaves school or college and enters on his business career, has a feeling of well-sustained self-confidence that is more than half the equipment needful for the conduct of affairs. . . . A good many years ago, I spent a few evenings with some students at one of the large American colleges. I . . . heard with surprise these college youths discussing questions that arose out of the businesses in which their fathers were engaged."

Now we do not want our schoolboys to be prigs or premature company promoters; but there is a happy mean which lies between that and our system of "Sports first, the rest nowhere," and that mean—of young fellows entering business life with a sense of its reality, its need of careful study and close application during the hours of work—has to be attained if we are to hold our own in the struggle for industrial existence. Especially is that so, if it be true, as the writer in "The Times" declares, that the superiority of the young American does not arise from his possessing greater facilities in regard to technical education. "In the United States there are some admirable technical schools; but, speaking from personal observation and not by the book, I should say we are as well off in England. . . . To me, it appears that the chief difference is in the young men themselves, and that is due to the previous home training."

Educational methods are, however, said to be, if anything, more rational and less pedagogic in the States than in this country. "We learn too much that we afterwards forget," says the Correspondent, and he refuses to the process of "getting by rote a Greek verb, or any other lesson equally empirical," the value claimed therefor by some as tending to develop memory and reasoning power. Certainly learning apparently meaningless things by rote is not the best means of developing the intellect, and utility should be to a certain extent considered in the arrangement of the curriculum. But what of euclid as a developer of mind and logical faculties? Yet most business men forget their euclid, algebra, and trigonometry early in life. Perhaps, being an engineer, "The Times" Correspondent looks upon mathematics as a *sine quâ non*. The study is, we agree, essential to full intellectual development; but it is often of no subsequent practical value. It may, then, be said that our educational methods should be amended in the direction of giving more instruction in that which will be either of practical value or calculated to both interest and develop the mind. "What sufficed for education when commerce and manufacturing industry, as we know them, did not exist, will not serve our turn to-day. It is a fact that those who control education seem never quite to realize. As a consequence, where a 'modern side' has been established in a school, it is too often neglected and despised by the chief authorities; and the students are looked on as belonging to a class altogether inferior to those of the 'classical side.' There are exceptions; but a nation is not built up by exceptions."

The foregoing cursory discussion of points which bear, not

merely upon the question of American competition, but also upon that which was opened up in these columns some time since—namely, the dearth of young men fitted for the first rank in the gas profession—has filled up all our present space; so we will leave to another article the labour and any other aspects of the general question.

ELECTRIC LIGHTING MEMORANDA.

The Ganz Electric Traction System—The Work of Mr. Mechwart—Tender for the Metropolitan Railways—No Electrolysis.

A VERY interesting communication relating to the Ganz specialities in electrical engineering appeared in the issue of the "Engineer" for the 25th ult. Readers of the "JOURNAL" who have acquired the good habit of keeping up with the procession of electrical developments, are aware that the firm of Ganz, of Buda-Pesth, are in the van of this progress; but it is possible that they may not know precisely the why and wherefore of this achievement of a business firm located upon the confines of Western civilization. Briefly stated, the reason for the eminence of the firm of Ganz and Co. lies in the thoroughness with which the venerable head of the establishment, Mr. Mechwart, grasped the potentialities of the alternating current, and the adequacy of his personal and industrial capacity for realizing them. It is very often remarked, in discussions upon technical subjects, that the present is an epoch of specialists; but very few, even among those observers of the signs of the times who perceive this characteristic of the age, realize how far specialization is carried in the best examples of the principle. Thus, in order to achieve the longest way towards perfect competency, and consequent success, a man must not only make himself an engineer, or a physician, as the case may be; but he must specialize more and more, the further he goes on the road to mastery, until at length he emerges from the ruck of his contemporaries with one distinguishing attribute, which is to him as the hammer was to the god Thor—the one agent with which his work must be done.

Modern industrial progress is bound up with this close specialization, which is nevertheless an observation usually overlooked by most of the statesmen and others who so frequently urge the British Nation to go in for more technical education and other things, with the express object of keeping up our industrial position in the world. All the cheap technical instruction, all the science lectures, all that can ever be done in the way of national education—useful as these advantages are in their way—can never go to the root of the matter, which is the impulse to specialize, and the ability to specialize profitably. There is no national delimitation in this respect. The man who specializes to good effect in ordnance, for example, may be a Yankee gas-fitter, like Sir Hiram S. Maxim; or he may be a sprig of Continental nobility, like Baron Nordenfeldt. If he is happily inspired, and is competent to follow his vocation, he will "get there" from any starting point. Mr. Mechwart, of Buda Pesth, was one of these seers of industry. He elected for the alternating current; and pursued the path of his choosing unmoved by the clamour that rose on all sides concerning the merits of other things. So long ago as 1883, the Buda-Pesth engineering firm made for the Vienna Exhibition the first big Zipernowski alternator, with the dynamo directly mounted on the engine shaft, and linear speed obtained by large diameter and multiplication of poles.

Messrs. Ganz and Co., as the "Engineer" correspondent testifies, were to the front from the first in the manufacture of alternate current transformers. They have stuck to the alternating current, even to the degree of keeping to the periodicity of 42 for lighting purposes to which they originally gave their adhesion. For long there was no alternating current motor. But still the Buda-Pesth firm persevered; and now their faith in the system has, it appears, been abundantly justified, and their own devotion to it rewarded, by the successful completion of what is described as a "very novel, very ingenious, and very beautiful" new traction system. The writer declares that he does not know a better. The first announcement of the system in English came in connection with the inquiries set on foot by the Metropolitan Railway Companies, with the object of ascertaining the conditions under which their traffic system might be converted to electric traction. It transpired that Messrs. Ganz and Co. had offered to do the work of conversion, and supply the electrical equipment, for very much less money than it was at one time thought it would cost. It was this intelligence that sent the "Engineer" Special Commissioner to Buda-Pesth to ascertain the general nature of the new method.

This appears to differ considerably from all the earlier systems. The scheme requires two trolley wires, and the rails, to carry a three-phase current at 3000 volts. The third-phase current travels by the rails, with contact by the driving wheels of the motors. The circuit is completed through the motors; every "live" conductor being completely encased in metal, so that there is no possibility of danger to life or limb. The trolleys are bronze cylinders running on ball bearings. The current does not pass through the bearings, but through an end carbon-brush contact. The adjustment of this part of the apparatus is made by compressed air machinery. Westinghouse air-brakes are used for the trains; and compressed air has been worked in largely in the general system. The air is compressed automatically by an electric pump. The motors are described as "pure induction three-phase motors." It is not possible for us to condense further the explanation given by the expert writer in the "Engineer" of the way in which the motors work; nor can we reproduce the statement. An important feature is that the action is truly reversible, so that during slowing-up three-fourths of the kinetic energy of the train is returned to the line as three-phase current; leaving only the remaining quarter to be dealt with by the brakes. The full meaning of this phenomenon can hardly be realized in anticipation. The linkage and other mechanical elements of the Ganz motor arouse the same witness's unstinted admiration. All this may be justified. Time will show. The peculiar beauty of the system, from our point of view, is that, as no continuous current is used, and the whole thing operates by induction, there can be no electrolytic action from a Ganz electric railway to trouble gas and water pipes near or far. This is a perfectly overwhelming consideration.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 348.)

ON the Stock Exchange last week, business proceeded as usual, with the exception that on Saturday, in common with all other institutions, the Exchange was closed. There was, however, nothing approaching activity, and things became quieter and quieter towards the close after the settlement. This went through without giving rise to any embarrassments—a feature which lent its aid in support of the generally firm tendency that prevailed. Money was in strong demand for Stock Exchange purposes, and for the usual requirements at the end of the month; but discount rates relaxed their stringency, looking forward to increased ease in the near future. In the Gas Market, business was much below what may be considered an average degree of activity; and there was not much variation in quotations. The movements, too, were irregular, responsive to special circumstances, and not in harmony with a general tendency in the market. Of the Gaslight and Coke issues, the ordinary was moderately dealt in every day at steady figures between 98½ and 99¾, with a firm feeling at the close. The market seemed to be content with the position and prospects as shadowed forth in the accounts, though perhaps it did not look much beyond the dividend. The accounts certainly furnish food for reflection; and some of the items may be found to envelope matter of much significance if they come to be explained. Of the secured issues, the maximum was the busiest; and it receded a point. South Metropolitan was very moderately dealt in; but prices steadily hardened, and the quotation rose a point. Only one or two deals were marked in Commercials; but they were at good figures. The Suburban and Provincial group was much neglected, and was quite devoid of incident beyond the lowering of Brentford debenture. Several stocks of this class have for some time past been allowed to stand at prices which were quite outside anything they were at all likely to realize, and should have been lowered before. The Continental Companies were irregular; Union falling, Imperial being steady, and European being fractionally higher on *ex div.* correction. Undertakings in the remoter world offered no incident calling for notice. The Water Companies were inactive; and changes of quotation were few and slight. The general tendency was to lower debenture stock prices.

The daily operations were: On Monday, Tuesday, and Wednesday moderate business was the rule at good steady prices, but not quite good enough to push quotations up. In Water, East London 3 per cent. debenture fell 1 on Monday. On Thursday, business became much quieter; but prices still kept very firm, although Gaslight maximum receded 1. In Water, East London fell 1, and Southwark debenture 3. Friday was as firm as any day of the week; and South Metropolitan rose 1. But both Continental Unions fell 3, and Brentford debenture did the like.

WATER BILLS FOR 1901.

The following Bills relating wholly or in part to water supply await the attention of Parliament.

The Burgess Hill Water Bill is to authorize the Company to construct additional water-works, including an adit in the parish of Ditchling and a new reservoir in the same parish. All underground waters found on the Company's authorized lands are to be appropriated. The works are to be completed within ten years. Additional 7 per cent. capital to the amount of £30,000 is required, with one-third loan. Metered supplies are to be charged 2s. 6d. per 1000 gallons.

The Cromer Water Bill is to incorporate and confer powers on a limited Company formed in 1875, and invested with statutory powers by an Order of 1882. The authorized share capital of the Company consists of £10,000 in original 10 per cent. shares, and an equal amount in 7 per cent. shares; and there is a mortgage debt of £5000. The area of supply is to be enlarged, and the supply in the extended district made effective within five years. The Company's capital is to be increased to £99,000, whereof £20,000 is to rank as original capital, and the balance to be raised as new 7 per cent. capital. The borrowing powers are to be one-third of the share capital. New water-works are to be constructed within seven years, including a pumping station with wells and

other works to be situated in the parish of Metton, and a service tank in the parish of Aylmerton. The land is to be acquired compulsorily within five years. The rates for domestic supplies are set out in detail, and do not exceed 6 per cent. Buildings of a public character, and trade premises are to be supplied by meter. Highway authorities may demand a supply for their purposes.

The Faversham Water Bill is to incorporate a limited Company formed in 1863, with a capital, authorized by an Order of 1889, of £18,000. The area of supply is defined as lying within a distance of 1½ miles from the Faversham Town Hall. The capital of the Company is to be increased to £37,450 by the issue of new 7 per cent. shares, with one-third borrowing powers. The works to be authorized comprise wells and pumping-stations in the parishes of Ospringe and Faversham Without, to be completed within five years. Powers are asked to prevent the fouling of the Company's sources of supply. The rates for domestic supplies range from 8 to 6 per cent.

The Llandrindod Wells Water Bill is to extend the limits of supply by the Company, subject to the stipulation that the Company shall not be compelled to supply water at a greater elevation than 1000 feet above Ordnance datum. Additional works are to be constructed, including a collecting tank at the Nursery Springs, in the parish of Cefnllys, and several service reservoirs—twelve works in all. The waters to be taken are tributaries of the River Ithon; and it is provided that all persons who have hitherto had the use and enjoyment of the waters shall have a sufficiency left in the usual courses. The works are to be completed in five years. It is proposed to make use of the water of the River Ithon for power purposes, at Cwmbrith. The rates for domestic supplies are to be 5, 5½, or 6 per cent. according to rental. Hotels and lodging houses are to be supplied by meter at the price of 1s. 6d. per 1000 gallons. New capital to the amount of £12,000 is to be raised, carrying one-fourth borrowing power.

The London Water (Purchase of Companies) Bill has already been noticed in the "JOURNAL" (p. 95). It proposes to empower the London County Council to acquire the undertakings of the Companies, for reasons set out in a very long preamble. The dates of transfer for the different Companies are stated; and the arbitrators are to be named. The arbitrators, who are to be empowered to employ expert assistance, are to ascertain the fair and reasonable value of the property, together with the cost of reinvestment (in the event of no arrangement being made by the Council under which such money may be reinvested without cost), and are to inquire into and consider all the circumstances, but are not to make any allowance in respect of compulsory purchase. The purchase may be made wholly or in part by the transfer of stock annuities. Permanent officers and servants of the Companies are to be duly provided for or compensated for loss of emolument consequent upon the transfer. The Staines Reservoirs Joint Committee are to be dissolved, and their property vested in the Council. The systems of the Companies are to be combined. The undertaking is to be managed by a Committee appointed by the Council, which may comprise as representatives, members of other bodies. Outlying local authorities may purchase their own portions of the undertaking. A special Water Fund is to be created in connection with the undertaking; and the Sinking Fund held by the Chamberlain of the City of London under the Companies' Acts is to be transferred to the Council.

The Metropolitan Water Companies (Amendment of Acts) Bill is to extend the provisions of the Staines Reservoirs Acts of 1896 and 1898, relating to purchase by a Public Authority to correspond with the provisions of the Metropolis Water Act, 1899—that is to say, to June 6, 1906.

The Oakham Water Bill proposes to incorporate a Company for supplying water to a number of places named in Rutlandshire, including Oakham, which are declared to be without an adequate and proper supply. The capital of the Company is to be £20,000, with £5000 loan. The works comprise a well to be made in the parish of Braunston, and a reservoir in the parish of Oakham, to be completed within five years. The rates for domestic supplies are to range from 9 to 7½ per cent., with 10 per cent. for hotels. Prices are specified for metered supplies, which are to be optional in certain cases.

The Rickmansworth and Uxbridge Valley Water Bill is to extend the limits of supply by the Company of this name to a number of parishes mentioned in a schedule. New and additional pipe-lines are to be authorized for serving the extended area, in certain cases passing through other Companies' districts. Powers are desired for purchasing the undertaking of the Slough Water Company.

The South Essex Water-Works Bill is to authorize the construction of numerous additional works, comprising a well and pumping-station to be called the Roding Well, in the parish of Ilford, and another similar work, to be called the Seven Kings Well, in the same parish. These wells, and the subsidiary works, are to be completed within five and seven years respectively. The parish of Havering-atte-Bower is to be added to the Company's district. Certain provisions of the Act of 1882 are to be repealed or amended. New capital to the amount of £300,000 is to be raised, not more than £100,000 of which is to be issued as preference capital. The dividend on the new capital is to be limited to 5 per cent. The loan capital is to be in the proportion of one-fourth. The local authorities who opposed the Company's Bill of 1899 and promoted a Bill in 1900 for the establishment of a Joint Water Board to acquire the undertaking of the Company, are to be authorized to borrow the amount of their costs.

The Swanage Gas and Water Bill is to incorporate a Company who are to take over the water-works established by the late Mr. George Burt, and now carried on by the Swanage Trustees. The water capital consists of £5700 original 10 per cent. shares, and £11,700 additional 7 per cent. shares. In addition to this, the Swanage Trustees have expended on the water undertaking about £2100 out of the income of the Swanage Estate; and there is a mortgage debt of £4350 on the undertaking. The water capital of the Company is to be increased to £46,000, with one-third loan. The water limits are to be the parishes of Swanage and Langton Matravers. The authorized works will comprise a well and pumping station and reservoir in the parish of Swanage, to be completed within seven years. Rates for domestic supplies are to range from 7½ to 5 per cent. Water sold by measure is to be charged for at 2s. per 1000 gallons. The supply within the specified district is to be made effective within five years. Certain private cattle-watering places are to be cared for.

The Tendring Hundred Water Bill is to extend the limits of supply by the Company over the parishes of Little Bromley, Ardleigh, and Little Clacton. Additional works, comprising a pumping-station in the parish of Wix, at Wix Cross, and two service reservoirs, are to be completed within five years. The domestic uses of water are defined and restricted. Fresh capital of £40,000 is desired, to form part of the Company's "A" shares authorized in 1884 and 1886, carrying one-fourth loan.

The Wells Water Bill proposes to incorporate a Company formed in 1872, who obtained an Order in the same year. The present share capital of the Company consists of £5000, with a 4 per cent. mortgage debt of £2000. The Company have expended £1238 out of revenue for capital purposes, which it is desired to repay out of any premiums to be obtained upon the issue of the new capital of £10,000 to be authorized by the Bill. The loan capital is to be in the proportion of one-third. Three new reservoirs are to be constructed; the works to be completed within seven years. The rate for domestic supplies is to be 5 per cent., not including water used for any purpose by means of a hose-pipe. Special rates are made for such supplies, including cattle watering. Water for sanitary purposes is to be supplied on demand at 1s. 3d. per 1000 gallons.

The West Surrey Water Bill is to extend the limits of supply of the Company of this name, to include the parish of Littleton, in the rural district of Staines, in the County of Middlesex. No excess rates are to be levied in the extended district. Power is sought to enable this and other neighbouring Companies to mutually assist one another with water in bulk, in cases of emergency. The Company desire to increase their capital by £80,000, by the issue of new 7 per cent. shares ranking equally for dividend to this extent with the existing shares, but without prejudice to the right of the old capital to receive up to its maximum dividend out of excess profits. The loan capital is to be in the proportion of one-fourth.

Riveting and Flanging Pressure.—In a recent issue of the "Journal of the Franklin Institute," some data were given concerning the pressures required for riveting and flanging. The author states that for ¾ and ⅞ inch rivets, pressures of 60 to 70 tons are required on the rivets; the work done being about 7200 foot-pounds for ¾-inch and 9500 foot-pounds for ⅞-inch rivets. These figures refer to bridge work; in boiler work, where rivets are shorter and the holes usually better finished, less power is needed, and the pressures required are about as follows: For ⅝-inch rivets, 25 tons; 1-inch, 66 tons; and 1¼-inch, 100 tons. For cold flanging of ½-inch steel plates, a pressure of 600 to 740 lbs. is needed per running inch; while with $\frac{5}{16}$-inch plates 710 to 750 lbs. pressure, and with ⅜-inch plates 380 lbs. pressure will be required, though much will depend upon the heat of the plate. For cold riveting, pressures of 300,000 lbs. per square inch are necessary.

The Detection of Lead in Potable Water Supplies.—In a recent issue of the "Journal de Pharmacie et de Chimie," the above-named subject was dealt with by M. Bellocq. He pointed out that water containing the most minute traces of lead offers to the practised eye a faint, though persistent, opalescence, which is destroyed by nitric acid. This fact gives rise to the opinion that the toxic metal may be in combination with some organic matter. Of such a character are waters which have remained for a long time in new pipes, or in old pipes which have been disturbed by some repair or soldering. Waters exposed, when in contact with lead, to the siliceous and carbonated dust of the air, are always contaminated with nitrated particles. For this reason the cleaning of lead pipes should be proscribed. For the detection of lead, the author uses a zincic reagent in which the soda has been replaced by ammonia. He gives these directions: Add to 1 or 2 litres of suspected water an excess of ammoniacal zincic reagent (5 to 10 c.c.), and leave perfectly quiet for some hours. Decant as much of the supernatant water as possible (this should be absolutely limpid), and throw the rest upon a filter, 15 or 18 centimetres diameter, for waters of average composition. This filtration is very rapid, and the dried precipitate is easily detached from the filter. The precipitate is decomposed with warm acetic acid containing a little acetate of ammonia, and filtered in a small funnel, through a plug of absorbent cotton wool, into a test-tube. The clear acid filtrate is touched with a glass rod wetted with a solution of chromate of potassium. If the water contains lead, a yellow cloudiness appears, and after the lapse of some time a precipitate of chromate of lead is formed.

PERSONAL.

Mr. Neil J. Peters, Assistant Water Engineer at Southampton, has been appointed to a similar position under the Corporation of Cardiff.

We learn that changes in the management are about to be made at Newent and Corbridge; Mr. T. C. Severs and Mr. A. C. Buckley having sent in their resignations.

Mr. T. F. Ennis, Superintendent of the Windsor Street Gas-Works, Mr. W. Chaney, Superintendent of the Saltley Gas-Works, and Mr. S. R. Barrett, the Superintendent of the Fittings Department, are named by the Gas Committee, in the minutes which will be presented at the meeting of the Birmingham City Council to-day, for advances of £50 per annum each in their salaries.

Sir Daniel Dixon, D.L., who was recently unanimously elected Lord Mayor of Belfast, in succession to Sir Robert M'Connell, Bart., has been closely identified with the gas undertaking of the Corporation; and, when filling the position of Chairman of the Gas Committee, he was largely instrumental in having the Gas Department brought to its present state of efficiency. His aim has always been the supply of gas as good and as cheap as possible. He filled the office of Mayor in 1892, in which year he received the honour of knighthood.

One result of the recent findings of the Contracts Committee of the Bolton Corporation has been the resignation by Mr. Alderman Miles of his seat upon the Gas Committee, of which he has been Chairman for fourteen years. The Committee have accepted it with great reluctance and regret, and have expressed their thanks to him "for the exceptionally able and valuable services" he has rendered to the Gas Department. It may be remembered that Alderman Miles is Chairman of Meters Limited, a Company with which the Corporation have dealings more or less directly.

In the paragraph on the management of the Driffield Gas-Works which appeared last week, it was stated that the services of the Consulting Engineer would be dispensed with after the expiration of the current financial year. It should have been made clear that this meant only so far as personal supervision of the manufacture and distribution of gas is concerned, for which Mr. E. W. Wright, the new Manager, will be solely responsible as soon as he enters upon his duties, which he will do shortly. Mr. H. Tobey, of Malton, retains his position as Consulting Engineer, and has just received instructions from the Gas Committee of the Driffield District Council to proceed with the preparation of drawings and estimates for a 200,000 cubic feet gasholder and other extensions of their works, which since Christmas have been managed by his son, Mr. Rex S. Tobey.

OBITUARY.

The death is announced of Mr. Henry de Winton, J.P., Chairman of the Brecon Gas Company.

The death has recently occurred of Mr. I. J. Collins, who for some years was associated with the firm of Messrs. Silber and Fleming.

Mr. P. Stewart, who till the spring of 1899 had been for many years Manager of the Stranraer Gas-Works, died suddenly a few days since.

The death is announced, in his 74th year, of Mr. W. T. Rouw, a Director of the Ruthin and Corwen Gas Companies and of the Ruthin Water Company. Deceased was a Justice of the Peace, and for some time a member of the Town Council.

The death is announced, at the age of 74, of M. Gramme, the Belgian electrician. In 1867 and 1872 he took out patents for electric batteries and the dynamo. For the latter he received 20,000 frs. from the French Government, and the Volta prize of like amount from the Academy of Sciences. When the decision was come to to adopt the Jablochkoff system of electric lighting in the Avenue de l'Opéra, Paris, in 1878, one of Gramme's machines was employed for the purpose.

We regret to record the death, last Sunday afternoon, of Mr. John Read, Secretary and General Manager of the Tunbridge Wells Gas Company—a position he had filled for 46 years. During this long period, Mr. Read always enjoyed the full confidence of his Directors. He was a shrewd man of business and had a strong personality. Though he never took a prominent part in the public affairs of the town, his advice was constantly sought and always cheerfully given. His unquestionably good business qualities were united to a kindly disposition, which gained for him many friends. He will therefore be greatly missed not only by those with whom his lot was more immediately cast, but by a large circle of fellow-townsmen. Mr. Read was a member of the Gas Institute, having joined that body in 1866. He had been suffering from asthma and heart affection for about six weeks.

Complying with a suggestion made by correspondents, the description of the new gas-works at Zurich, which supplied an interesting feature of the issues of the "Journal" last month, has been reprinted, with the plates and numerous illustrations, in pamphlet form of foolscap size. Copies may be had (as mentioned in the advertisement elsewhere) at 2s. 6d. each.

COMMUNICATED ARTICLES.

BUSINESS SKETCHES IN AMERICA.

SOME METHODS WORTH EMULATING.

By E. W. T. Richmond.

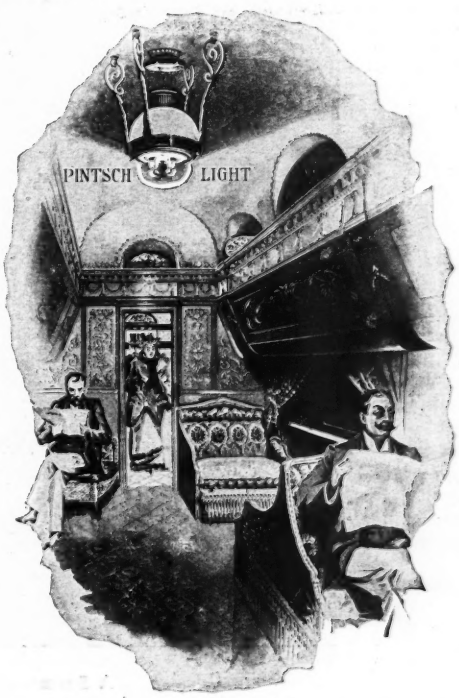
(*Continued from p. 274.*)

"And therefore as a stranger give it welcome:
There are more things in Heaven and Earth, Horatio,
Than are dreamt of in your philosophy."

"Hamlet," Act I., Sc. 5.

Pintsch Oil Gas System.

The transition from Mr. Humphreys to the Pintsch lighting system (in which I became considerably interested, partly owing to the large amount of railway travelling which I accomplished) is not so great as readers who are not acquainted with one fact would imagine. In the fall of 1881, Mr. Humphreys accepted the position of Chief Engineer to the Pintsch Lighting Company, in which appointment he remained between three and four years, finally resigning because those who were controlling the Company were not willing to work along the liberal lines necessary to the proper development of the business. The information given hereafter, manifestly shows that the Company early saw, after his secession, the wisdom of Mr. Humphreys' views, and entered upon a broader policy. Curiously, the Pintsch Company's present Engineer, Mr. H. Dixon (to whom I am indebted for much of the information respecting this Company), was in 1877-81 a classmate of Mr. Humphreys at the Stevens Institute of Technology.



The Pintsch Company have works in various parts of the country, and sell the gas in cylinders to the railway companies. The gas (which is produced from crude petroleum) is compressed to 150 lbs. pressure, and has an illuminating efficiency of 11 candles per cubic foot. The standard price is ½ c. per cubic foot, which equals $5 per 1000 cubic feet. In the Company's office, there is an interesting comparative installation showing the ordinary city gas under pressure and the Pintsch gas; and a very satisfactory method of testing the relative efficiencies is thus provided. During my frequent night railway journeys, I had ample opportunity of judging of the effect of the system for lighting the cars; and I am enabled, by the courtesy of the Company, to give an illustration showing its use in the luxuriously appointed cars of the American lines. There is a warmth and richness about the light which cannot be approached by the electric light, besides being infinitely better for the eyes to read by.

The following is a graphic illustration of the progress made in the application of the Pintsch system on the railway roads of the world:—

Year.	Cars.
1883	11,422
1885	17,600
1887	26,100
1889	35,096
1891	45,300
1893	54,175
1895	64,800
1898	85,600

Cooking on Railway Cars.

With a studious consideration for the comfort of passengers on the great American railroads, the management of several have applied the Pintsch gas-range to their dining buffet cars; and this has proved a no mean factor in the making of contented travellers, by supplying them with hot, satisfying meals. The Safety Car Heating and Lighting Company issues a neat little pamphlet on the subject, which furnishes information as to the popularity of the cooking arrangements on this system. The New York Central's Empire State Express (which is the fastest long-distance train in the world) is an example; the orders for steaks, chops, &c., amounting on this one train alone to several thousands in the course of a year.

A Long Journey and Notes by the Way.

Returning from Philadelphia to New York, two or three days were again spent in that city in (among other matters) preparing for the long journey which I had mapped out for myself—taking in Baltimore, Washington, Pittsburgh, Cleveland, Dayton, Cincinnati, Chicago, Detroit, Buffalo, Niagara Falls, Hamilton, Toronto, Ottawa, Montreal, Quebec, Boston, and back again to New York, and absorbing the last 23 days of November. I found generally, that the vitality, resources, and accumulating wealth of the States and cities through which I passed are enormous. During the journey, I made copious notes on the gas affairs of the cities visited, and present them here in the form in which I collected them.

Baltimore.

Baltimore is for America a steady-going city, somewhat similar to Liverpool, is situated at the head of the Chesapeake Bay, and is a centre of the oyster-dredging industry. I do not think very much of its streets, nor of its public lighting, which is chiefly done by arc electric lamps. But a change is imminent, as I understand the Welsbach Company are about to enter into a large lighting contract.

The Gas Company Rejuvenized.

There have been some recent changes in the Gas Company. Changes, I find, are effected more drastically in America than here. Some of the shareholders felt that more enterprise was wanted in developing day consumption; and thereupon they took steps to secure the fulfilment of their wishes. About 40 per cent. of the shares were handed over to the control of one gentleman, who proceeded to suggest the entire reconstruction of the Company's Board of Directors, with the result that he himself was drafted on to the Executive Cammittee; and the day of push and progress has dawned in Baltimore.

Gas Cooking the Goal.

In my first article, I gave a little information about the vigorous steps that are now being taken to develop the use of gas for cooking; and, as I then mentioned, the very man who boomed Trenton (Mr. Moses) was offered by the Directors, and accepted, the superintendence of the development of this business.

Payment by Results.

Mr. Moses is to be paid on the results he achieves by his keenness in pushing the gas-stove business; and the question has often occurred to me, Why cannot gas directors and committees on this side initiate some system by which their managers should be paid by results?—say, by a moderate salary and a commission on profits? What a field for reward, according to merit, would be opened up to many managers, who are now eating their hearts out, chained to old customs by precedents, with boards of directors who fail to recognize the opportunities they are missing. I could name a score or more of such men off-hand who would, under such changed conditions, get their chance, but who are now chafing under their restrictions. But at the same time, when all the shortcomings of the Directors are allowed for, there are (I cannot help feeling) many Boards who would frequently move faster if only properly coached by their engineers and managers. Many engineers who are fearing the introduction of the electric light or the loss of some big customer, like to keep the fact of increased consumption within reach up their sleeve, waiting until some necessity arises for producing their trump card. Surely it is an error not to make the most of the present opportunities, and let the future, with its possible losses or competitions, take care of itself. I should like to see emblazoned on the walls of all Board and Committee Rooms the words of Brutus—

> "There is a tide in the affairs of men,
> Which, taken at the flood, leads on to fortune.
> * * * * * *
> We must take the current when it serves,
> Or lose our ventures." "Julius Cæsar," Act IV., Sc. 3.

A Street Gas Explosion in Baltimore.

A Street Explosion.

On the evening of the day that I reached Baltimore, a very serious street explosion occurred. It arose from the sinking of a gas-main, and the consequent severing of service connections; the primary cause of the accident being the relaying of a water-main, and the subsequent subsidence of the soil. The result of the explosion was remarkable, as will be partly seen from the accompanying photograph. The culverts and streets were torn up at intervals for some three-quarters of a mile; and the windows of the houses and shops were entirely shattered—many of them being boarded up when I visited the scene. Fortunately, no lives were lost; but a few persons were, I learned, injured by the falling *débris*.

A Well-Known German Savant.

That a visit of a leader of the European gas industry is highly appreciated by American gas men was impressed upon me by the fact that, at one works I called at about this stage of my journey, a visit paid by Herr von Oechelhaeuser so far back as the time of the Chicago World's Fair was mentioned to me in a manner which revealed the delight the reminiscence afforded the speaker. Among the works which had the pleasure of receiving Herr Oechelhaeuser were New York, Cleveland, Chicago, Buffalo, &c. His visit, in fact, is regarded as quite an event; and I think this shows that few European gas engineers of note have visited American works. However, the strong and pregnant interest that is being manifested on all hands in water gas will doubtless induce many engineers to spare the necessary month or six weeks in viewing some of the works of the West. Such a journey (I feel I can now speak with some little authority) would not be wasted.

Washington Gas.

At Washington I found that the price of gas is $1·10; and the Company have only 50 prepayment meters in use. Stoves are sold at a profit of 10 to 15 per cent. An exhibition is held by the Company every

year or alternate years. Last year they commenced one for three weeks; but it was so successful that they extended it to six. By the way, the American Companies are in the habit of paying the expenses of these exhibitions; and the gas-stove makers only provide the exhibits.

MR. M'KINLEY. Just for an instant, I must turn aside from gas matters to mention that I had the privilege of an interview with the President, Mr. M'Kinley, while in Washington. Through the kind offices of a friend, my card (with others) was sent in direct to the great man. The little party were only kept waiting for a few minutes before he sent for us. He was most affable, and conversed on topics of current interest with avidity. Congratulating him on his election, he said he felt very sincerely his responsibilities with such a large constituency as 75 millions of people. The President is of medium height, and thickly set, with something of Mr. Joseph Hepworth's ease of manner, and not unlike him in stamp of figure, but of larger build.

PITTSBURGH GAS. The next city visited was Pittsburgh; and the feature of its gas service is the natural gas, which is distributed to ordinary consumers at 25 c. per 1000 cubic feet. The manufactured gas is composed of 25 per cent. water gas, and 75 per cent. coal gas; and it is supplied at $1 per 1000 cubic feet for lighting only. Almost all the cooking and heating is done by natural gas, which is contrary to what I found in Detroit later in my journey. The Company supplying manufactured gas also own the natural gas supply, which is piped into the town from sources 100 miles away. They also control the electric light and the United Electric Car-Traction Company, and light the streets entirely by electricity.

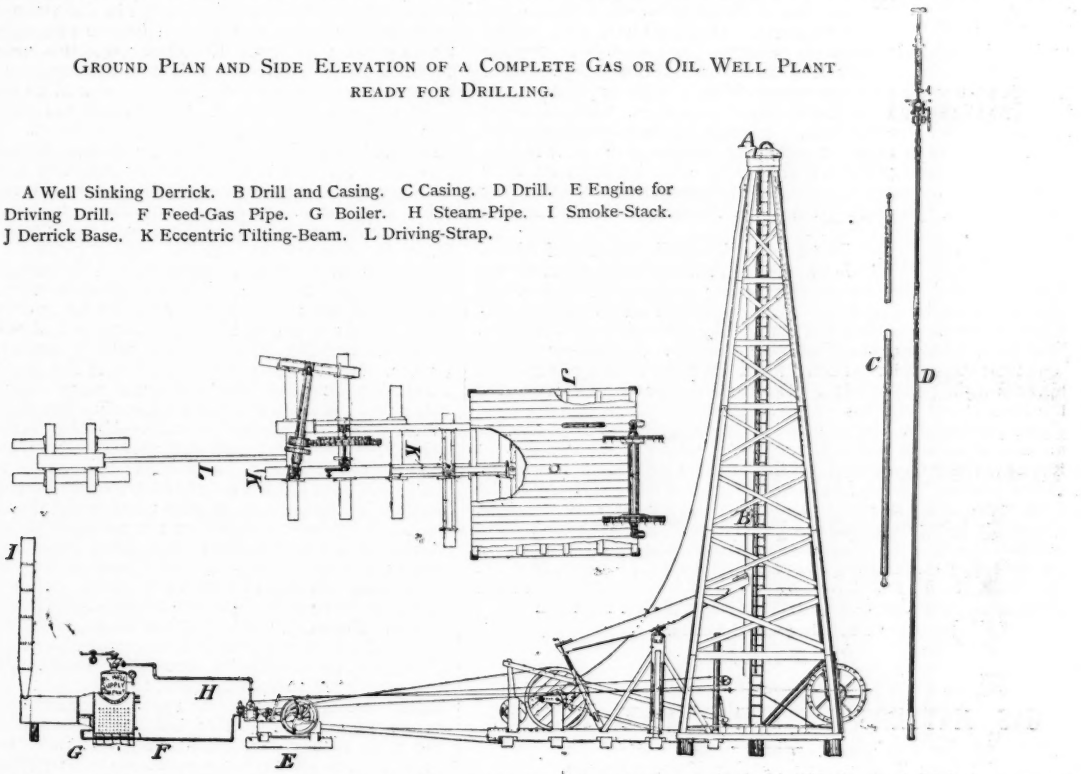
MESSRS. YOUNG FROM BRITAIN TO PITTSBURGH. The General Manager of the Pittsburgh Company, Mr. R. Young, is a Britisher, hailing from Falkirk, which he left 35 years ago. His brother, Mr. John Young (who is Manager of the Alleghany Natural Gas Company), left Falkirk for Hawick, and thence he passed in turn to Stoke, Hull, and Sheffield—finally stepping into Pittsburgh some 24 years ago. Mr. John Young, of Norwich, is the son of the latter and nephew of the former, and was for some time a resident Gas Engineer in the United States; and, like the writer, although he sees many things which might be improved in his native country, "with all its faults he loves it best."

ALLEGHANY GAS. The Alleghany Natural Gas Company supply a district with a population of about 120,000, and is controlled by the Pittsburgh Gas Company. Natural gas is distributed at as low as 10 c. per 1000 cubic feet for heating boilers and furnace work.

NATURAL GAS. Frequently the mains and services of the natural and manufactured gas run side by side. While the natural gas is of 8-candle power for lighting, the manufactured gas is of 20-candle power. The former has a thermal efficiency of about 700 units per 1000 cubic feet; and it suits incandescent burners splendidly. Less gas is used, at a smaller cost, and more light is obtained. If it were not for the uncertainty of the continuation of the supply of natural gas, it would be even a more formidable opponent than it is. It is used very extravagantly, and its cost lies chiefly in the enormous length of mains that have to be run for its conveyance. It is frequently necessary to sink wells 1600 to 2000 feet deep to tap the gas, "when it is far into the bowels of the land;" and they sometimes meet with a rock pressure varying from 50 lbs. to 1100 lbs. The Pittsburgh Company have 385 different wells tapped, varying from 50 lbs. pressure at the initial point to 900 lbs. The cost of sinking these wells is about £1000 sterling each. It is this cost, along with the mains—as before mentioned—that prevents the exploitation of natural gas by the general public. One of the sources of supply of the Pittsburgh Company is the Virginia Wells, which are 90 miles away; and they may be taken as a fair average sample. The gas starts at a pressure of 260 lbs., and loses its force to the extent of 250 lbs. by the time it reaches Pittsburgh—arriving there with a pressure of 10 lbs., or nearly 2800-tenths. This, of course, has again to be reduced to a pressure for the consumer of about 2 oz., or (say) 35-tenths.

GROUND PLAN AND SIDE ELEVATION OF A COMPLETE GAS OR OIL WELL PLANT READY FOR DRILLING.

A Well Sinking Derrick. B Drill and Casing. C Casing. D Drill. E Engine for Driving Drill. F Feed-Gas Pipe. G Boiler. H Steam-Pipe. I Smoke-Stack. J Derrick Base. K Eccentric Tilting-Beam. L Driving-Strap.



THE GAS WELLS.

The States of Pennsylvania, Ohio, and Indiana are the great natural-gas producing States; oil and gas being found side by side. There are also similar fields in Canada. The invariable rule is that wherever the wells are discovered, the mains are run to the nearest large town, being tapped *en route* to supply any smaller districts. The accompanying illustration, as explained, is a side elevation and ground plan of a complete outfit ready for drilling oil or gas wells.

The population of Pittsburgh is 350,000; and the Gas Company supply Alleghany, with a population of about 120,000. There is one small Gas Company on the south side not incorporated with them; selling natural gas at 25 c. per 1000 cubic feet, and drawing their supply from Ohio and Indiana—the nearest well being 100 miles away. Only a few slot meters are in use—the natural gas supply having acted as a deterrent to their adoption. For the past ten years, a dividend of 7 and 8 per cent. has been paid.

The Pittsburgh Company sell 100 million cubic feet of natural gas per day. This means a revenue, at the prices charged, of about £1,500,000 per annum for natural gas. While they sell 100 million cubic feet of natural gas, they only sell 2 millions of manufactured gas (fifty times as much natural gas as manufactured); but, spite of this, they have 20,000 consumers using their illuminating gas. They have a holder for the storage of 5 million cubic feet of natural gas for maintaining uniformity of supply. It was erected by Mr. John Young, in 1899, is the largest holder in the States, and thus far, I believe, the only natural-gas holder.

SURFACE COAL. Coal outcrops here; and it is an absolute fact that people are known to pick up pieces of coal from their gardens and burn it. This, as Isabella says, in "Measure for Measure," is

"As true as it is strange."

HOISTS. I also observed here that the hoists are very good. The automatic opening and closing of the doors to various floors in works' hoists are simple and safe. The gate rises as the lift comes to the floor, and descends as the lift leaves it; the action being vertical—portcullis fashion.

VARYING WEIGHTS AND MEASURES: The American weights and measures are similar to ours; but perhaps rather more confusing, as the ton at Pittsburgh means 2000 lbs., whereas in the Eastern States it means 2240 lbs.

GAS-BOILERS. About 80 per cent. of the gas consumption in Pittsburgh is used for steam-boilers; and the large works there run entirely with natural gas, at a charge of 10 c. (or 5d.) per 1000 cubic feet. The day before I was in Pittsburgh, they had sold 125 million cubic feet of natural gas in 24 hours.

LIGHTING QUALITIES OF THE TWO GASES. As an experiment, two 5 feet burners, one supplied with natural gas and the other with ordinary gas, were fitted up. The light from the natural gas (consisting of marsh gas, CH_4) was very poor; but, when the gases were turned on to a Welsbach burner, the advantage, if anything, was, it appeared to me, with the natural gas.

COIN METERS. In Pittsburgh, there are 9000 prepayment meters in use; and this, I may say, is about the best record in this line of business that I met with.

EXPLOSIONS. There was an explosion with natural gas through carelessness in connecting up with a piece of india-rubber tube the day I was in Pittsburgh. I seemed to be in the way of explosions, having, as already mentioned, had a similar experience the day I was in Baltimore; the explosion there, as stated, arising through the sinking of the gas-pipes through excavations for laying water-mains.

NOVEL POINTS FROM CLEVELAND. In Cleveland (which has a population of 250,000) I found there were 25,000 gas consumers. Manufactured gas, chiefly coal gas, is supplied; water gas being used as a stand-by. The gas has an illuminating power of 18 candles; and the charge is 75 c. This Company are also very enterprising in their methods of extending business and building up day consumption. They advertise stoves, and fix them free from the meter, for three months in the year. They do this for one particular portion of the year for the purpose of pushing trade, and helping folks to make up their minds quickly. In the short space of three months last year, by means of their special advertising, the Company fixed no less than 2000 stoves.

PUBLIC LIGHTING. In regard to the public lighting of Cleveland, the trunk lines leading out of the city are lighted with arc electric lamps; and the balance of the city, so far as the gas-mains extend, is lighted with ordinary flat-flame burners. Portions not reached by the mains are lighted by Welsbach burners, supplied with gasoline. A number of the streets in the city have been lighted for some time by Welsbach burners with great success. They also light and provide gas for the lamps free; and this means an expense to them of $15,000, or £3000 per annum. In other words, they make the Municipality an annual present of this sum. The Company have also agreed to pay the city 6½ per cent. on the profits made, for a concession of ten years. This is, I believe, the longest term that any of the States are able to grant a concession for at one time—an exception being the Philadelphia concession to which I have previously referred. Against this, the Company make whatever profits they can. If they can pay 50 per cent. dividend, they are at liberty to do so. The Company, in fact, promise with the Roman General Cominius, in "Coriolanus," that the town

"Shall divide in all with us."

(To be continued.)

GAS MATTERS IN THE UNITED STATES.

STATE REGULATION OF GAS UNDERTAKINGS.

I told you in my previous letter that I fancied before long the battle between corporate interests, as representatives of capital, and specially the corporations with *quasi*-public functions and the taxing power, would be on in full force, unless the corporations learned wisdom. I have been spending the Christmas season in Boston; and while there I met a number of lawyers who are interested in such things, and better than ever before understood the reason and method of the battle. It was at a club dinner that I first became conscious of the trend of things; and almost immediately after I was so fortunate as to be invited to a formal discussion of a defence against an attempt to confiscate by legislation under the guise of regulation. It was in October last that I heard the gentleman express the opinion that a 10 per cent. dividend was "little enough" on gas shares, "considering the risk of hostile legislation;" and I admit I did not understand him. I do not yet; but I have a notion of his meaning. It seems that in Massachusetts they have a law by which the method of book-keeping and accounts generally is regulated for all "private corporations having public functions," but really intended only for the lighting and transportation companies; and they also have a law making the price of service rendered—*e.g.*, illuminating gas—dependent upon the net earnings. This would seem to operate in two ways. Beyond a certain point, it tends to discourage improvements in processes when the improvement in question tends to increase the net income, and it also tends to make the town officers hostile critics of everything the gas company may attempt to do—of course, with the avowed reason that they seek to lower the price charged for gas, alleging that the company reduces its net income on purpose to obtain a higher dividend. After some years of dispute between the Gas Company and the select men in a certain town, the matter has come into Court. It was at a discussion of this case in various aspects that my good fortune made me a guest. Those discussing it were all of them notable corporation lawyers, so their views are not without some interest. The opinion generally advocated was that, since the original contract was made, gas making, as a business, had quite changed in status—that it was no longer an experiment, much less a speculation; that the value of the properties represented by the franchises had increased, not by any peculiar effort of the owners, or their servants and representatives, but by reason of the increase in the number of the consumers; and that since the companies were, by their charters and the nature of the case, practical monopolies, the obligation to use, and not abuse, their position was obvious. This was admitted on all sides. Then a special case was raised—that of the Company in question. It seems the Company was organized about 80 years ago, and went into business with 611 meters. It now has 18,411, in approximately the same territory. It has never increased its capital beyond that of its incorporation; and not one share has been sold by public sale for nearly a quarter-of-a-century. The shares are all held either by the Directors or by members of their families. The Company has no debts, has a very large surplus, and could, if so inclined, pay not far from 1½ per cent. per month free and clear of all tax. Under the law, the price of gas has been gradually reduced until it is about $1.25 (say, 5s.) per 1000 cubic feet. These, I understand, are facts admitted on all sides. What precipitated the row, I do not know; but, as I understood it, the proposition was made to divide the surplus, and to begin the new century unincommoded by so great a burden. No sooner was this noised abroad by action taken towards this end, than the town, by its select men, proposed to buy the whole Corporation, and to set the price by condemnation proceedings. This the owners considered as pure and simple confiscation, and naturally resisted. What happened next, not being a lawyer, I do not understand; but as nearly as I can make out, the fracas began by someone demanding an investigation of the accounts of the Corporation since some time thirty years back. Anyway, it was shown that all the extensions and rebuildings, and all the changes of every sort, had been paid for by the consumers; that the original capital had been, either by special dividend, or in some way (I do not quite understand how), returned to the heirs of the original owners of the Company, who own it now; that all the extensions had never cost the Company a cent; and that if all had been as it should be, from this point of view, the price of gas should be nearer to 12½ c. than $1 25c. It seemed to be the opinion of the gentlemen who were discussing the matter that there was some show of right in the claim that the town should be allowed to buy the plant and Corporation outright for its face value—about $500,000 was the price offered—while others said this was utterly unjust. It was contended that, had the property been put upon the market and sold a few shares at a time, it would have easily brought to its present owners five times such a price; and while the dividends would undoubtedly have justified an increase in the face value of the stock, which would probably have been made by the speculative buyers, who would have unloaded it on to the public as a regular 5 per cent. dividend stock, there would have been no question raised as to the price of gas or the legitimate character of the transaction. Because, however, it had been retained by the families of the original owners, and not reorganized, this effort, which was characterized as robbery, was being made. There was much and very interesting discussion; and finally one man very quietly said: "We are going to hear a great deal more of this sort of thing before we are done with it; and if this attempt is successful, and the town succeeds in condemning this franchise, there will not be one dividend-paying corporation with public functions that will not feel the blow." Then a gentleman said: "The practices of these promoters are dangerous things. The injury done to every industrial enterprise by their manipulations is extreme." Another said: "It is a pity if, because a corporation is successful, it has got to defend its life like a stag assailed by wolves." Another: "That is not the question. The true question is how far has an artificial, any more than a natural monopoly, a right to compel the public to pay an unreasonable price for a necessary of life." The reply came: "What is a reasonable price?" Another said: "We recognize the right of the State to extinguish a natural monopoly." Another: "We affirm the right of the State to extinguish an artificial monopoly, whenever it wills to do so, by just the same means." "You mean, whenever such artificial monopoly is a paying investment, I presume?" "Yes; if you like to put it so. Why not?"

This brought up then, as it eventually brings up everywhere, the inevitable question: "What is a fair dividend in an industry depending virtually upon an artificial monopoly created by contract and by law?" Surely no one who owned shares in a bank would expect a 10 per cent. dividend, unless a large surplus had been accumulated by previous self-denial; while here in these industrial companies just the reverse obtains. Why should not the owners be forced to accept (say) 6 per cent. per annum free of all charges, when hardly any legitimate business brings more than 5 per cent.? When a gas company's president says: "My company has paid 10 per cent. per annum free and clear for the last twenty years, and *that is a very small dividend for a gas company*," the question naturally comes up: "Why for a gas company any more than for a bank?" The difficulty is that the officials of

these companies try, unconsciously no doubt, to run the company for their own benefit; and as the directors own the majority of the stock, in most instances they succeed. Anyway, the powerful pressure of the consumer is in action; and if the owners of the gas-works, instead of sulking and fighting, would recognize the fact of the great value of the unearned increment, accept the guaranteed 6 per cent., taxes, and all essential repairs and improvements, and give the town a director, the consumer would be easily convinced of the honesty of the management, and cease the agitation for confiscation which is now in progress with more or less vigour in every State. Either companies must show what the Yankees call "some gumption," or they will actually be compelled to surrender valuable properties to public management.

American Types of Gas-Engines.

In my previous letter, I referred to the interest taken in the use of gas as a motive power at the Denver meeting, and mentioned my intention to investigate the real status as far as I might find an opportunity. Armed with some knowledge, obtained from having investigated gas-engines with reference to the use of recently invented gasoline air gas mixtures, I started out to find something new, and I found it. When I was engaged in the pursuit of information on this subject before, my hunt ended in a sense of disappointment at my results. The gas-engine thus seemed not only a crude makeshift, but a faulty conception; the ideal appearing to be rather an engine driven by the vapour of a hydrocarbon than a true gas-engine. Even in this city, and *à fortiori* in the smaller towns, oil rather than gas from the city supply was the frequent source of power; and gasoline engines were to all other forms as three to two. Now all this has changed. The gas-engine has become relatively quite common; and I find many small shops which used to buy power from some steam plant now using gas with an explosion engine installed on the premises. I mentioned in a letter some few years ago, that there was one place in New York in which gas was used to make steam. This plant was dismantled, and the building removed about three years since; and now power for the business is obtained from four explosion engines, and four makers list the place among those using their machines.

The points to which I have directed my attention this time have been the frequency, number, and size of the gas-engine; the relative increase in power and efficiency; and the actual increase in size. One knows from observation of the most cursory sort that the "Otto" cycle is the one most in use; and whatever may be his opinion of a machine so designed, he must acknowledge that such a decided choice can only be explained on the ground of fitness. This idea, once dominant, is now questioned in many quarters; and the Otto engine, either in its original and lawful form or as made by its numerous imitators, is no longer the criterion—no longer the undisputed type machine. My attempts at systematic investigation soon proved to me that, considered commercially, explosion engines are all classed as one in the American mind; and every maker considers himself under an obligation to furnish machines which can be used with gases properly so called, illuminating gas, producer gas, natural gas, the vapour of gasoline, as obtained by passing air through carburetters, and a form using oil. Starting with this form, I found two distinct types; one in which the oil was heated and sent into the cylinder for explosion in the shape of vapour near to its ignition point, the other in which it was pulverized by an atomizer, and sent in fluid and mixed with air. There should theoretically be a great difference in the efficiency of these two forms; but I was absolutely unable to get any reliable data as to cost of running. One rather bright man remarked that the chief drawback in both forms was "soot." So far as I can ascertain, these "oil-engines" are never known to burn the oil clean—in fact, this defect is quite too common in them all. The supply of air in contact with any given particle of oil cannot possibly be sufficient to burn it to carbon dioxide and water. Hence there is an enormous loss in potential energy; and the carbon collecting as soot, and not infrequently in crystals, destroys the cylinders or obstructs the valves, or in some other way makes trouble. With these manifest disadvantages against it, the oil-engine holds its own in American country districts, on account of the cheapness of the fuel, and the fact that it can be purchased anywhere.

The engine which "gasifies" the oil by heat is a much better machine, but is for some reason not so popular as the atomizer type. It is said that some very peculiar accidents have taken place consequent upon the use of all kerosene vapour; but my attempts to verify the stories have failed. Of course, the naphtha launch-engine type is the same all over the world; but the wide use of carburetted air has brought into notice a special form of engine. Curiously enough, only one style seems to be in use; the rivalry of the gas-machine men being without result in this special regard, both the makers of gas machines advocating the use of the same engine.

I followed the question up, and was forced to believe that their choice was not prompted by the almighty dollar alone, but by an actual superiority in design and efficiency. The type advocated seems to be the only one really working its best with the air vapour mixture; and it is really not without pleasure and some amusement that one sees the engine driving the air-pump which supplies it with fuel. These air-gas engines are, of course, relatively small, as they are intended in the first place for pumping water for domestic use, and the notion of driving machinery with them is an after-consideration. Intended for pumping water in country houses and hotels, their sphere of usefulness has been extended to the laundry, the ice-machine, and numberless other appliances. The power consumption costs less when the gas-engine is used than when human muscles serve, even for turning a mangle. (*Pace* Dickens.)

This brings us to the gas-engine proper—the machine using a permanent gas, either illuminating or producer as the source of power. These engines interested me greatly; and I studied them with every care. Manufactured in a very small number of styles—practically there are only three type forms—they are made in a ridiculously large number of sizes. One maker, beginning with ½-horse power, makes ten sizes between this and 20-horse power. Another, beginning at 1-horse power makes (or at least catalogues) fifteen sizes up to 50-horse power. The reason given for such a multitude of sizes is that the margin between the possible demand and supply of power is less than with a steam-engine. This is certainly true, because the explosion will be incomplete, and thus reduce the power, if too much gas is introduced; and heat is lost if the air-cushion introduced is too great. Be this as it may, the fact that the sizes made are so numerous remains.

The teapot tempest in regard to electrical igniters still continues; but I do not think they are anything like as common as a few years ago. At least, there are not so many to be seen in the warerooms. The vast majority of these engines, great and small, are single cylinder, single-acting engines. A few have two cylinders; some have still more; and the notion of making the engine double acting, as it should be, is steadily growing.

This idea of using so very heavy a driving-wheel may be all right; but if the machines being run are so constructed that steadiness in the motive power is of consequence, the results of a missed cycle might be serious indeed. This has been met in one standard type—maybe the one most fittingly called the standard American machine—by the use of two cylinders exploding alternately. If the explosions came differently, there would be nothing more to the purpose than a two-cylinder machine; but as it stands now, they are not ideal. This particular machine is single acting; the cranks so placed that the explosion does not come at the point of extreme efficiency—that is, the gas and air mixture is notably expanded again at the instant of explosion. This is said to be practically the same as cutting off at half stroke; but—and this is the curious part of the arrangement—the explosion may be made nearer the beginning, or even at the very beginning, if the load requires it. Truly, the theory of this thing is beyond my mathematics; but it seems to work perfectly. Still, there must be a terrible loss in efficiency when the explosion is made so late in the stroke as it is said to be made when the machine is running light.

Be this as it may, the engine is one of the most popular made, and has any number of medals to show. As I have said, it is a single-acting, two-cylinder machine, making one explosion in each revolution. These makers list engines to 50 indicated horse power, and make to 150 indicated horse power on special contract. There is no gainsaying the good running of these machines, especially when using water gas or producer gas which has not been enriched. In fact, they have plenty of evidence to show the splendid service in either carbon monoxide or mixtures of it and hydrogen; but they have no real hesitation in saying that the relative efficiency is less in cases where illuminating gas is used for fuel, when this efficiency is expressed in terms of the foot-pounds of available power at the belt-wheel per million B.T.U. in the gas delivered to the engine, but not when reckoned per million B.T.U. actually exhibited in the cylinder. This distinction is needed because the actual and the exhibited B.T.U. in enriched gas do not agree. More information is needed.

In my rambles, I found engines with both cylinders on a single piston-rod, the cylinders tandem, and only a single crank; while the two-cylinder engines previously mentioned had a separate crank and piston-rod for each cylinder. These tandem engines, like the other two-cylinder engines, were only single acting, giving but one explosion to the revolution; but some of these tandem engines were arranged to give two explosions per revolution. These engines—not all by one maker—seem to be regarded as an experiment; and a rather doubtful one. Why this should be so is not clear, because if two cylinders can use a single piston-rod, and working single acting can efficiently give one explosion per revolution, why not work them from both ends, and give two? The efficiency claimed for these double-acting engines is very great; and the indicator cards and test runs seem to prove the claim to be well founded. But they are, as I have said, relatively complicated, and are not especially liked.

Another form of gas-engine recently built, also with a surprising record for efficiency, is equipped with air-pumps and "condensers" or "refrigerators." There is certainly a new departure in prospect here. So far, only a 5-horse power engine has been constructed. The claim made for this engine is the same as that advanced for the condensing steam-engine—greater power with the same expenditure of heat, because of wider temperature range. The ideas involved in this machine are unusual; and the following description may therefore have an interest of its own. The theory and description are given in, as near as may be, the words of the inventor and possible patentee: "You know that the compound condensing steam-engine is more powerful and more economical because it has a wider temperature range than the non-condensing engine. The same is true in this machine of mine. By means of the air-pumps and refrigerators, the working range of the hot gases is extended many degrees, with a consequent increase of

power." Of course, there were no means at hand, even had I the will, to test his words and works. Still, if the results are equal to his expectations, we can say of his theory "Important, if true."

A Miniature Gas-Engine.

I note your statement in relation to "no break" in gas engineering in your review of the century's work. I wish you were here. Then, if I could gain permission, I would take you to the top floor of a big machine-shop on the water front, and show you an engine I have just seen. It measures 12 in. by 12 in. on the bedplate, and is only 7 inches high, measured to the top of the engine proper. It is a rotary engine, but not a turbine; and it is a real engine, not a toy. This miniature machine makes 400 revolutions per minute; and its brake horse power was demonstrated to be 87·7 per cent. of the theoretical horse power calculated from the B.T.U. delivered to the engine—my determination of the B.T.U. in the gas they were using being taken as the basis of calculation, which determination they claim is too high. This little toy is being used to run a lathe, to see what there is in it; and to watch the almost volitional way in which it rested when the load was taken off was wonderful. The lathe was cutting screws; and the "pink, pink" of the tiny explosions when there was no load but the lathe's friction, and the engine was admitting gas only once a second, became simply an accentuation when the explosions reached their full number of 800 in the minute. I cannot describe the engine accurately without the use of plates; but imagine a Behrens engine with a differential cut-off, a sensitive governor, a packing which packs and yet has no friction worth mentioning—there is none, unless the pressure of the explosion has driven the packing against the face of the cylinder—using about 10 per cent. of its power to drive its air and gas pumps, leaving about 85 per cent. for driving machines, and you will have an idea of what it looks like. Not so radical a departure as the steam-turbine, but infinitely more practical and to the purpose.

I asked for the drawings to send to you; but the owners said the patents were not yet allowed. It is certainly a wonderful conception; and the infinite number of uses to which it will be put staggers one. Of course, the machine will be made to run with steam and condensed air; but to me it seems only an "ideal gas-engine." The owner of the machine-shop asked the inventor to let me see it reversed; so they took off the work on the lathe and put on a brake to give resistance, and ran the machine now forward, now backward. A wheel with spokes was in the train; and as they ran the engine, the spokes would appear for an instant and disappear like a "vision" in the instant's halt between the opposed revolutions. It is a wonderful machine.

Cheap Incandescent Mantles.

Do the street and push-cart men in London sell incandescent lights? This phase of the battle against the Welsbach by the Cheap Jack mantles is on here; and really it is amusing to see the people buy. The push-cart men offer a fixture in imitation of the approved pattern, a glass chimney, such as it is, and the mantle all for 50c. (say, 2s.), and a glass shade for another added. I purchased one of the mantles. Measured on a photometer, it gave 15 candles for 5 cubic feet of gas when first lighted. The light emitted rose steadily for about an hour, when it was 25-candle power. At the end of three hours it was giving only 18-candle power; and two hours later it had fallen to pieces. This is one of the difficulties we have to contend with here.

American Gas Cooking and Heating Practice.

One of the London makers of domestic apparatus for using gas has been visiting the States, and has given us here some idea of the development of cooking apparatus using gas as fuel which has been reached in England. The American apparatus is not yet ideal; but it is certainly not inferior to some he described—indeed, he did not seem to realize the difference between the styles of goods shown him when he first came in contact with American ideas. The salesmen, who aided his peregrination, seemed to think if his were the best European practice the European house mistress must be less exacting than her American cousin. Indeed, it cannot be truthfully denied that the American is almost, if not actually, hypercritical; yet this attitude has been the stimulus to the efforts which have so much advanced the practical apparatus here.

This demand has two quite distinct parts—the gas apparatus which it is intended shall be used by the servants (simply substituting one fuel for another), and the apparatus intended to aid in the emancipation of the house mother from the domineering maid. From this, it follows that it is not in homes sustained by bottomless purses that the highest development will be found, but rather in those homes in which the lack of purse must be supplemented by personal exertion. This distinction is not always met, by those who surprise it, with a full understanding; but the fact remains, if you wish to see the highest development of American domestic art, it must be looked for, not in six-storey palaces, nor even in large *appartements*, but in small houses and in *appartements* of six rooms or less. In these may be found machines for saving not only foot-pounds in labour, but for economizing inch-ounces; and for saving steps, not in yards of distance only, but in fractions of a foot. The uninitiated might imagine it was space the architect would save; but it is far from always thus, it is quite as often distance he seeks to avoid. This fact will be forcibly brought to your attention if you happen to enter some building—there are now a number—divided into flats of (say) five rooms each, intended to be occupied by persons of moderate means who wish to escape the tyrant in skirts. Such *appartements* will rent at from £10 to £12 per month. Hot water, janitor service, elevator, and steam heat, of course, are included in the rent; and often the use of the laundry and steam-heated drying-room. In these, every labour-saving apparatus known to American ingenuity usually finds a place; and these appliances will in time reach lower strata in the intellectual scale of the housekeeper's development.

Here, again, your view of the end of the century differs from mine. Can it be possible that the few miles which intervene make all the difference! You speak of the use of gas for fuel in very discouraging tones—in tones which surely gas engineers will not share, much less the gas companies and the mistress of the home. Can you, after writing your "leader," believe me that an American gas-fire is distinctly a thing of beauty—a thing to which the followers of Ruskin and Morris give approval because it is what it is? Gas-heating apparatus here is by no means something "to hang on the grate-bars," a makeshift; it is rather one of the means to ends, or to an end—the liberation of the house mother. The universal method of using gas in private houses, when heating is the object, is either the gas-log or the "pumice fire." I do not believe you could find a tenant for a house of any pretensions, nor for a first-class *appartement* of even five rooms, within the Greater City, nor in Chicago, Boston, Philadelphia—indeed, in any large town—unless such tenement was provided with "open fires," by which is universally understood a gas-fed fire with either "logs" or "pumice." Surely you must have these things in England! The gas-log is to the eye a fire of wood, but without the ashes; while the other is a fire of coals, *sans* the dirt and the housemaid and the coal-scuttle.

I am writing in my home—my library—and some three yards away is my fire. I have but just turned the gas half off and put up the fire-screen, the "logs" are glowing and radiating rather too much heat, and the howling tempest outside seems only the set contrast to my comfort. Of course, if the appliances for using gas are as crude in London as you hint, then I can understand that gas cannot be used. But here, the gas-log is as needful as the Welsbach light. Even in the private office of a wealthy business you will find the fire of gas, only here it will most likely be the pumice fire, because anything thrown on such a fire is consumed—which is a convenient fact, and an incontestible advantage which the pumice fire has against the log. However the case may be in England, the few are those who still use coal in rooms where dust can injure; and the women would make indeed a merry war were it suggested they should ever give up again the luxury of the gas-fire, which, I think, may most truthfully be called in this country a domestic necessity. Only five years ago we often heard the question, "Do you burn gas? It must be terribly expensive." Now it is said—I am the witness, I have heard it—"How can you afford to burn coal? I should think the destruction to your house and your furnishings would be appalling. Think of the ruin of your clothes; and how can you keep anything clean? I would not have a coal-fire in my house for a thousand dollars a year." Wherever you may go, you will find it just the same—even children know the value of gas as dustless fuel. Nor is it costly. I do not think the fire which heats this room costs me a cent (say one half-penny) an hour. Wood, I am certain, would cost ten times as much; and I do not think coal would be any cheaper, saying nothing of the dirt.

One incongruity is noticed in almost every drawing-room this winter; the fire-place is nearly always ornamented with the brazen furniture of long ago. How funny this would seem to Mr. Ruskin we can well imagine. The beautiful fire-irons to support the "logs" are in their proper place, so is the fender when women will wear so many yards of lace upon their dresses. But why tongs, why the poker, what use have we for the shovel? And most ridiculous of all these properties is the polished scuttle beside the pumice fire. Some of them are relics of the last century in very deed—not the century just ended, but of the century when gas was not, or was a luxurious light, when coal was the fuel of the rich, the envied, as now it has come to be of the very poor, of those who live as savages and in want. Yet with all this use of gas, the amount of coal consumed seems hardly lessened, except in the residential districts. A lady in this neighbourhood, who must perforce find her pleasure in trifles and her views of the living world from her couch beside the window, declares that in the "park" on which she lives the amount of coal delivered has fallen off perceptibly the last three years.

I notice that you mention that gas-stoves are tenants' fixtures. This is partly true here, if for gas-stoves you read cooking-stoves and kitchen ranges. The reason is simply hot water. Since no house in the States would find an occupant unless hot, as well as cold, water was to be had at the tap on every floor, if not in every bedroom and a number of other places, as it is usually, there must be some constant and heavy fire to heat it. But in houses furnished with steam by the various companies who supply it, there is no need for a heavy fire; and in these houses gas-ranges will be as surely found as the radiator in the hall between the inner and outer doors. In this city, it is the need for hot water which gives countenance to the coal-fire in the kitchen.

In Chicago the same is true; and I do not believe that there is one city in the States in which you could find a fire of coals in a building with an elevator service. Elevator service spells steam-pump and steam-pump boilers, which, in turn, issue hot water; and this, of course, eliminates the coal-range and introduces the gas-stove. This question of hot water is the real *crux*. Given

a satisfactory means of heating water with gas as fuel, and the last refuge of coal will disappear from the domestic economy. It seems quite beyond belief, but is a fact none the less, that there are only two appliances in use here for heating water; and neither is a success. This is the question now demanding solution: "Wanted, an appliance to use in the household for heating water with gas, which will make use of not less than 90 per cent. of the heat exhibited by the burning gas." The man who invents this machine, using the said 90 per cent. of heat, has the world before him here. But in doing this needed thing, he must not leave the others undone.

Prepayment Meters.

Were the companies to put in prepayment meters and cut the rate a bit, and find a way of getting rid of the "meter readers," it would be a most capital plan in any number of cases; but the people who can protect themselves will not concede anything to the company unless they get a "bite in return." This is gradually being understood in the smaller towns, and we do not hear as much about it as we did.

Novel Cooking Closets.

No one who reads the magazines and newspapers dealing with the development of Sociology here can rid himself of an uneasy feeling that Society is in a condition the like of that which goes before some social upheaval. The rebel mistress already combines, as does the domestic tyrant horde; and already we hear of black-listed mistresses as well as black-listed housemaids, and the attempt has been made to return to the condition when the house mother really prepared the food. Of course, it was foredoomed to failure; but the trial made it patent that, given the needed apparatus, liberty was in sight. Then the bachelor-man took up the question, by the use of the chafing dish for the light meals and by purchasing the heavier one at the "club." Every Yankee—man, woman, child—must eat thrice between 7 a.m. and 8 p.m., or die. Finally, it became fashionable for the ladies of the family to use the chafing dish; and now, just as the steam-driven automobile has displaced the "wheel," just so the "laboratory" or "cooking-closet" succeeds "the silver waiter."

Two illustrations of this idea have come under my notice quite recently in the professional business of a single architect into whose studio I chanced to wander. In answer to the inevitable question, "Anything new?" he showed me plans for two "modern cooking-closets"—"laboratories" would have been a better word, so handy, so compact, so scientifically developed seemed every detail in plan and finish. The motive was in both cases to "save steps." One might say the idea was to paraphrase the dictum of "the preacher" in reference to wisdom, or of Cato in reference to money. So planned were these two "closets," that it is hard to imagine anything more, unless two things be made to occupy the same space at the same time; and the expenditure for lifting was also reduced to the minimum. Even the gas-range had been condemned, on the ground that it required useless change in position and the lifting of a burden when in a disadvantageous pose. The conditions to be met by the two designs were quite unlike, but had one feature in common—the elimination of the servant girl. In the one case from the caprice of the owner of a house who likes to show her skill in cooking; in the other, to eliminate "the biddy" as a public fraud and private foe.

The first design extended and changed the "butler's pantry" (*sic*) of a house having a hall, two parlours, and a dining-room on the main—street—floor. The space occupied was 8 feet square and the full height of the dining-room; but as nearly 2 feet were taken from either side for dressers and drawers, the unoccupied floor was 4 feet by 6 feet. At the convenient height, a shelf ran around the room forming the "table." Under this, were drawers and cupboards for containing various supplies and utensils. Upon the table were the appliances for making use of heat. These were the "hot-plate," on which anything desired could be cooked as upon a griddle. On this, a beefsteak could be so cooked that it differed from one broiled on the coals only in one particular—it was cooked evenly. When this plate is in use for broiling, a hood is drawn over it by which a very great draught is created, carrying all the steam and the like up the flue. When not wanted for broiling or frying cakes, the expenditure of a trifling amount of force causes this plate to vanish, and an apparatus of spiders for holding pans takes its place above the burners; or, instead, a water-bath will take the place of the spiders on one end, giving instantly a change which usually requires either much space or useless labour. True, all these cannot be used simultaneously; but either two can, over one-half the fire each. Thus one can have all the vegetables just finishing their cooking and a beefsteak broiling on an apparatus the same height as the table, with temperatures under perfect control, and no smell or heat where heat is not wished for, and plenty where it is. When seated before this apparatus, on which maybe a beefsteak is being cooked, the window is to the right, in front of which is the apparatus for making bread and pastry. Here quite as much ingenuity is shown in saving space, and even more in saving expenditure of muscular exertion; for the surface on which the pastry is rolled is made of glass, and the rolling-pin of iron, lead weighted, yet so made that less exertion is needed to handle it than is usually expended on a wooden one. At the same time, the work is now done perfectly and with absolute cleanliness. Here also is a machine for mixing bread and suchlike, another for grating and the reduction of various simples of the kitchen into small fragments, ranging in size from a fine powder to the size of a raisin.

On the side opposed to the previously described cooking apparatus, is one for baking bread and meat. Here, too, perfect protection against any undesired heat or vapours is secured; and such a demand for control of temperature was displayed that, in gratifying it, a control within 2½° C. either side of a given line can be assumed anywhere within possible limits, and within certain limits the variation from the reading will not be ½°. The thermostat controls both gas and ventilation.

This most successful machine is used for raising bread as well as for baking it; and the method of using it will be illustrated by the following, which is given in, as near as may be, the words of the man who told it to me: "When Mrs. H. decides to make bread, she first of all selects the yeast which she intends to use; for on this she says the flavour of the bread depends. How they are obtained is not stated; but she is said to have not less than a dozen sorts, each one in some way different from all the rest. Having selected the yeast, she measures out the flour, by an apparatus for this purpose provided, into the 'hopper' of a mill, and turns the handle until mixture is complete and the bread is delivered into the baking-pans. Then these are placed in the oven. The thermostat is set at the *raising temperature;* and nothing more is done after lighting the gas under the oven until the next morning. Then, when ready to hasten breakfast, the index of the thermostat is moved to the baking temperature; and at the proper time the oven is opened and the bread removed." If this is not to be called domestic science, what shall be worthy of the name? Yet all depends upon the gas supply, but for that the saving of labour and the perfectionment of skill were alike utterly useless.

The other, much the same, is yet a little different. While Mrs. H. has the maid to wash such of the dishes as she is willing to trust to her, the other house mistress has declared herself independent to the fullest extent, and has no aiding hands to help hold up her own. It may be that, as she says, she wants none—"would not have them if she could."

Under these conditions, the architect was forced to add the apparatus for washing dishes. This he has done, and done so well that nothing has been left to chance. "I can cook the dinner for my husband and my boys, and a good big dinner too, without taking one step or lifting anything heavier than a small saucepan, unless I have to dish a turkey or a goose, and I only lift this from the pan to the platter. See, even my refrigerator is just on the same level as my table. I bend down for nothing, unless it is something put away under the shelf in my cupboards, where I am sometimes compelled to put things out of the way. Things accumulate so with three men constantly buying, often with more zeal than wisdom." So much for the promise of the new century in the way of the kitchen.

MR. DIBDIN'S LATEST PRONOUNCEMENT ON THE COMMERCIAL VALUATION OF COAL GAS.

(*Concluded from p.* 275.)

The idea that the consumer requires only one fixed standard or unit of light is entirely a figment of imagination without parallel in actual practice. He does not require lights of one degree only, but all sorts, from 2 up to 20 candle power; and the chief reason for the popularity of the flat-flame burner is the unique advantage of being readily adjustable to anything between a glimmer just sufficient to enable one to see the way about the apartment, and the full light requisite for reading, writing, or other employment. Nearly half the lights in a house are in passages or small rooms where a high unit is simply unnecessary waste; and the exact photometrical value of the unit required in practice is not only subject to the surroundings—a light that would give the impression of being sufficient for anything in a room with white walls and ceiling, would simply appear like darkness visible in an apartment panelled with old oak—but is a matter of individual taste. Get rid of the effect of furniture and environments by imagining half-a-dozen rooms exactly alike in every respect—walls papered with similar material, same pattern carpet, and so on—and no two of them will be lighted with equal candle power. One man puts up a 3-light centre piece, and is not happy unless the room is flooded with a brilliant illumination. He therefore lights all three burners. Another also has the three lights; but from economy or from choice, never uses more than one. So with side lights. Other consumers will have a pair or two pairs of brackets, and use anything between one and four burners. But in any case a unit lower than that selected by Mr. Didbin is preferred, as a number of lights break the shadows and give a more equable diffusion; and, as already remarked, a lower unit would give the poorer gases a much better chance. The consumer, or for that matter many a gas-fitter, knows nothing about the photometrical value of the unit. He likes plenty of light, or does not care for too much of it; and, apart from that, the brackets or gaseliers are selected with an eye to decorative effect. The gas-fitter may advise three burners or other number as the case may be; and his suggestion receives fair consideration, but is not the ruling factor.

But, notwithstanding all this, the consumer is not a limp and helpless individual, such as Mr. Dibdin represents, who must have

his "unit" even if the equivalent goes up to 9s. 3d., regardless of the rate at which the meter works. He is fairly keen on matters connected with the rate of consumption; and if the bill went up 50 per cent. from an "apparently inexplicable" cause, the unit would have to go down, and he would make alterations in the arrangements for using gas that would have the effect of knocking Mr. Dibdin's carefully plotted curves into a cocked hat. In the course of 70 years' experience in the use of gas, he has contrived to acquire a fair general notion of how to go to work in order to get good value for his money; and by a sort of survival of the fittest process, the burners best suited to the particular quality of gas supplied come to the front and are those most extensively used.

Especially is this the case in regard to different qualities of gas. There is no such thing in practice as the same make and size of burner being in general use for qualities of gas covering a range or variation of over 8 candles. The burners generally used in Edinburgh are not largely in demand in London; and if we select three towns respectively supplied with 14, 17, and 20 candle gas, we shall find that particular sizes and patterns are in vogue in each place. How is it that, as Mr. Leicester Greville happily puts it, no one is "a penny the worse"? How is it that the Parliamentary Returns are absolutely silent on this important point? If such large differences really obtained in practice, there would be very definite evidence in respect to consumption per consumer or per head of population, of a character too pronounced to have entirely escaped the attention of statisticians during the 25 years or so that have elapsed since the first return was issued. The same as regards water gas, which has been introduced in many towns without any appreciable effect on the sales of gas. It is incredible that a consumer in one town should secure three times as much value from a given quantity of gas, where 19-candle quality is supplied, than he could obtain in another town where 14-candle gas was sent out, and that such a state of things should have prevailed for half-a-century without attracting attention. There is no hesitancy about attacking a gas company. The consequences may be unpleasant if one publicly stated that Bones's vaunted prime English beef had an Australian origin, or that mangel-wurzels are the principal ingredient in Squashers' celebrated pure fruit jams. But nothing of the sort need be feared with regard to the gas company; yet there has never been a definite charge, supported by chapter and verse from actual practice, to the effect that 14-candle gas is dear even if sold at a cheap rate.

The experiments with mixed gases seem to show that water gas, like the lower qualities of coal gas, is more susceptible to fluctuations of pressure and rate of consumption than higher quality coal gases; and this set of experiments is therefore open to the same objections. In this case, also, Mr. Dibdin goes far beyond practical limits. No company in England supplies neat water gas, and but few go beyond 20 per cent. I have commented on the utter absurdity of expecting to get practical results over a range of 8 candles from any one burner; and it is equally absurd to take a burner constructed to use coal gas, and apply it to quite a different article. But the results claimed for mixtures up to 20 per cent. of water gas could not occur in practice without some evidence of the fact in the way of increased sales or complaints from consumers. An allusion is made in the paper to apparently inexplicable rises in gas bills. These are exceptional and not general. If every resident in a street or district experienced a rise of 50 per cent., the fact would not be hidden under a bushel, or require demonstration by means of diagrams. The Parliamentary Returns give the sales of all gas undertakings and the quality of the gas they supply; and it would be more to the point if apparently inexplicable rises in the sales over any particular district could be shown.

Some explanation of this divergence between theory as represented by the paper, and practice as shown by the Parliamentary Returns, is afforded by the disagreements between the several gases tested, which would seem to show that, when operating under the unpractical condition of straining one size and make of burner over a range of 8 candles, the photometrical value is not the only thing to be considered, as the chemical composition of the gas exercises an important effect. As much may be evidenced by a careful comparison of the diagrams A, B, and C. We may note, in passing, that the greater stress is laid in the paper on the results depicted in A; and apparently the author has followed the well-known example of not letting the other side have the best of it. Tracing out the curve for a No. 4 Bray's burner on each diagram, we find that the unlucky user of a 12·2 quality Widnes mixture would have to deplore an equivalent of 7s. 6d.; while with South Metropolitan 12·5-candle gas, the equivalent is under 5s. The South Metropolitan consumer gets something for his money after all. The Gaslight and Coke article is quite as bad as the Widnes, a 12-candle gas giving 8s. 3d. Change the No. 4 Bray for a Sugg No. 5 table-top, and the equivalent falls to 3s. 9d. for Widnes, 3s. 10d. for South Metropolitan, and 7s. 3d. for Gaslight and Coke. To put the thing another way, take a No. 4 Bray and a fixed equivalent of 4s. Under these conditions, a 14·5-candle Widnes gas, 14·6 Gaslight and Coke, and a 13-candle South Metropolitan gas are shown to be of equal commercial value. The most probable explanation of the discrepancies is the difference in chemical composition in the first place, and the influence of the special treatment previously accorded to the samples in order to prepare the desired quality in the second.

If a slight difference in composition exercises so great an effect in the laboratory, under special precautions to secure uniformity, still larger variations may be expected under the rough-and-ready conditions of everyday usage; and we have a strong point in favour of fixed testing-stations as against the portable photometer, and of the very elaborate arrangements made by the Gas Referees in preference to any simpler plan that leaves larger latitude to the judgment of the individual operator. These matters do not appear to have escaped the attention of those who originated the present legal testing arrangements; and, more than that, they in some sense anticipated the possibility of manufacturing a case against the gas companies by means of experiments made with burners unsuitable to the quality of the gas under examination, or used under unfavourable conditions. Mr. Dibdin's ideas appear to run in the direction of selecting burners in ordinary use—as offered for sale in large quantities by well-known makers—for the standard, rather than the argand. If he followed out the spirit of the law, which prescribes that the burner should be of such a make, and used in such a manner as to do full justice to the gas, by using the burners under the conditions prescribed by the makers as likely to develop the best results, there would not be much to say against it. But what might be expected if we forced 15 cubic feet per hour through the standard burner? What would be the answer of Mr. Sugg or Mr. Bray to any user of gas who complained that their burners were wasteful and extravagant when used at two to three times the rated capacity? He would simply be told to use the burner in a proper manner. Or what result as regards economy of light might be expected if we force the sperm candle to consume 6 grains per minute; if we take an oil-lamp intended to use 1 oz. of petroleum per hour and force it to use 3 ozs. or if we connect a 100-volt electric lamp on a 300-volt circuit. Would any scientist care to take the results of operations on these lines as the basis of diagrams to indicate the commercial value of sperm, oil, or electricity? Yet this is exactly what Mr. Dibdin has done in respect to gas.

Striking out the experiments made under forced conditions as to pressure or rate of consumption, the makers of fish-tail burners have no reason to be ashamed of the results obtained under normal conditions. In fact, it is evident that they have suffered a great injustice. The public have been accustomed to the assurance that, in practice, the duty obtainable from coal gas is about 2 or 2½ candles per cubic foot of gas consumed per hour. Some electricians, in comparing the cost of electricity with that of gas, have been troubled with serious qualms of conscience lest they should mislead by claiming as much as 2 cubic feet, and carefully explain that this is only the result when the burners are new. But the average quality of gas as actually supplied is not far from 17 candles; and, according to Mr. Dibdin, any consumer may obtain from a gas of 17·2-candle quality a duty of 3 to 3½ candles per cubic foot, by means of Sugg's table-top burners. Some of the results even go one better than the standard argand, which is usually credited by Mr. Dibdin with too much bias in favour of the gas. These remarks also apply to Sugg's slit-union and fish-tail. Bray's and Peebles' burners, with a slight exception, are all well up to a 3-candle duty; and even the "butcher's bat," usually supposed to be an extremely wasteful and extravagant article, comes out as very little below the standard argand. These particulars are taken from Table I., which is the basis of Diagram A; and as the corresponding tables for B and C are not published, I am not able to pursue this comparison further. The figures quoted bring out the important fact that, with a 17-candle gas, the consumer can obtain from any fitter or plumber burners of the flat-flame type that will, in practice, yield a duty equal to that of the standard argand. And I question whether the manufacturers of such burners would find it a difficult task to modify them in such a way as to secure equally satisfactory results from 14-candle gas.

Theory of the Water-Gas Process.—We regret to have to hold over till next week the concluding portion of the abstract translation of the articles on the above subject from the "Journal für Gasbeleuchtung" which was commenced in our first issue for the present year.

Society of Engineers.—The first ordinary meeting of this Society for the year was held last evening at the Royal United Service Institution, Whitehall. Under Mr. H. O'Connor's presidency, the past year has been a successful one; and his last act as the head of the Society yesterday evening was to present the premiums awarded for papers read during his term of office. The new President (Mr. Charles Mason) also delivered his Inaugural Address, which was well received.

Coal Industry of India.—The Calcutta correspondent of the "Daily Express" considers there is a large prospect that India will, in the near future, be in the position of being able to supply many parts of the Empire with coal. The coal industry has been progressing during the last few years by leaps and bounds. The output last year was nearly 40 per cent. in excess of that of 1899; and this year it is probable that the yield will not be far short of 10 million tons—all of it good, and much of it excellent coal. A beginning has already been made in the direction of exportation—a shipload of Bengal coal having been despatched on the 3rd inst. for use on the Egyptian Railway. One of the companies engaged in raising coal paid a dividend last year of 40 per cent., while the average of 17 companies was 9½ per cent. Coal is found in abundance over extensive areas in Bengal, in Hyderabad (Deccan), in Upper Assam, the Central Provinces, and elsewhere; and there is one rich coalfield 1000 miles in extent which has scarcely been touched.

TECHNICAL RECORD.

WEST'S LATEST RETORT-CHARGING MACHINE.

The latest of a long series of patent specifications issued in the name of Mr. John West, and dealing with the mechanical charging of gas-retorts, has just been published. It is dated Jan. 17 last year; No. 1097. A more extended reference to the invention is required than could be given in the "Register of Patents" columns; and we propose now reproducing the specification practically speaking in its entirety, accompanied as it is by nine sheets of drawings.

The object aimed at by the inventor was the application to the coal-hopper of a travelling retort-charging machine of a coal-measuring chamber, adjustable to the quantity of coal regularly fed to the charger, which enters and deposits the coal in the retorts, and also the application of an improved charger for depositing the coal in an even layer in the retorts. This coal-measuring chamber (which is suspended at the base of the coal-hopper holding the supply of coal for a number of retorts) is a rectangular chamber having a telescopic outer case suspended by bolts, in such a manner that the case may be telescoped in and out, to decrease or increase the capacity for coal of the chamber; while at the top and bottom of the chamber slide-doors at suitable distances apart are arranged to be worked by gearing or by levers in such a manner that, when

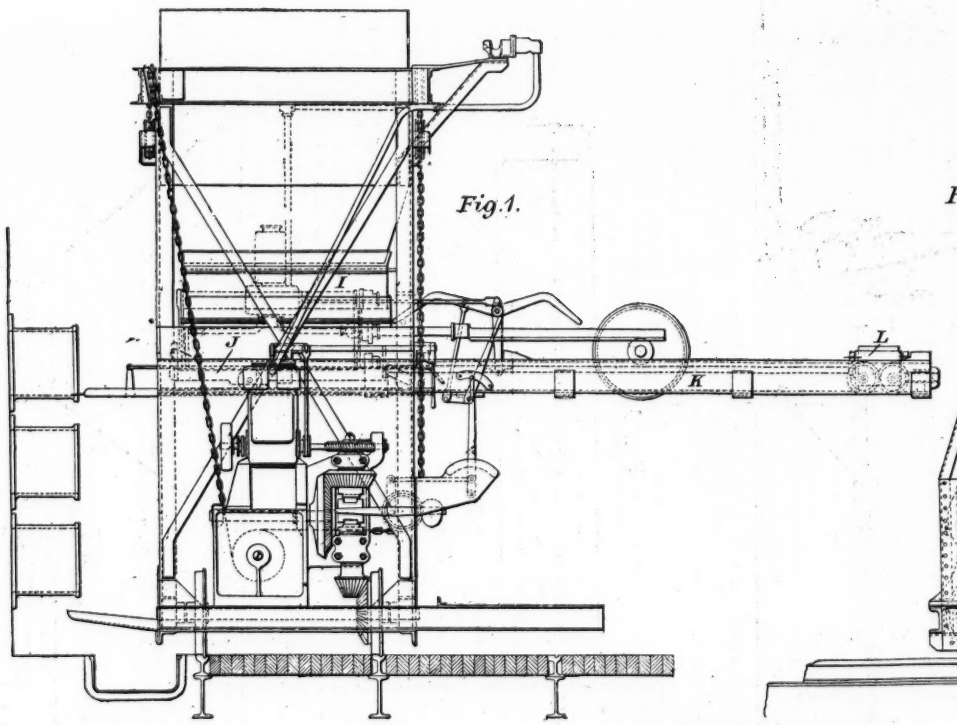


Fig. 1.

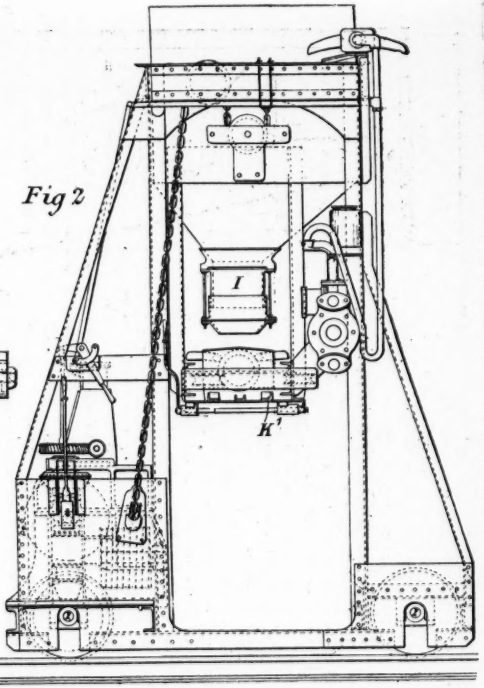


Fig 2

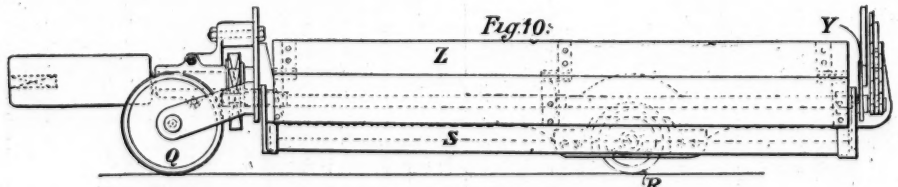


Fig. 10.

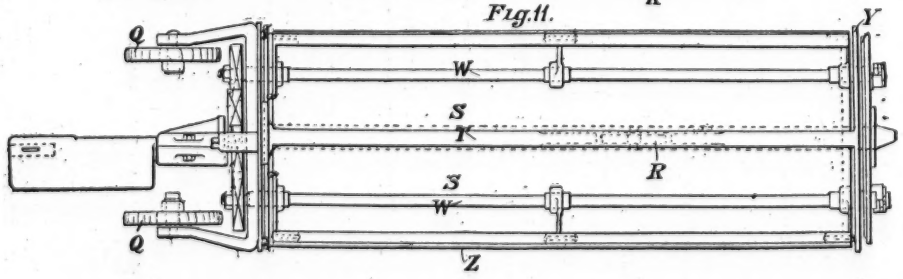


Fig. 11.

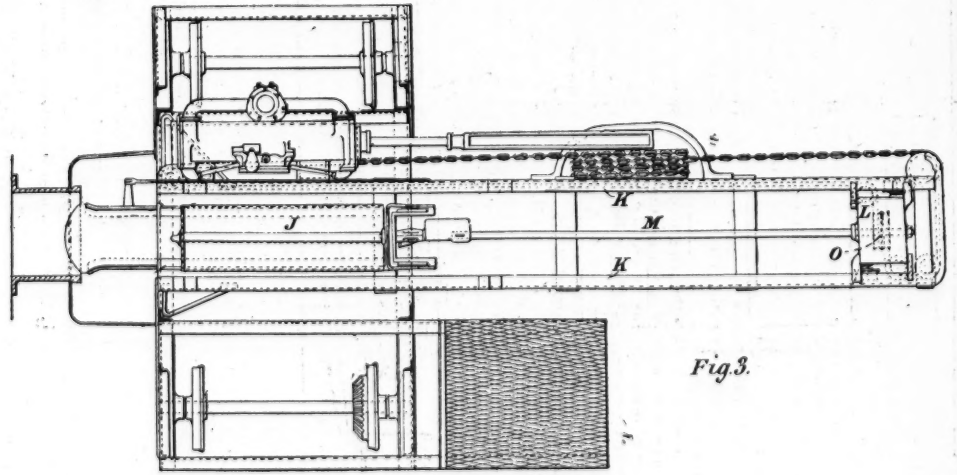


Fig. 3.

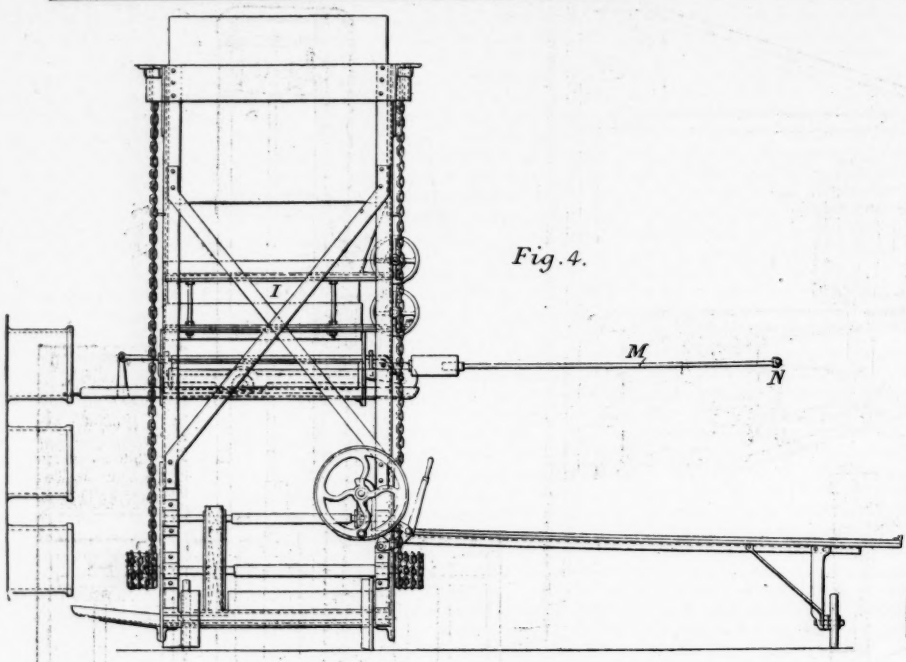


Fig. 4.

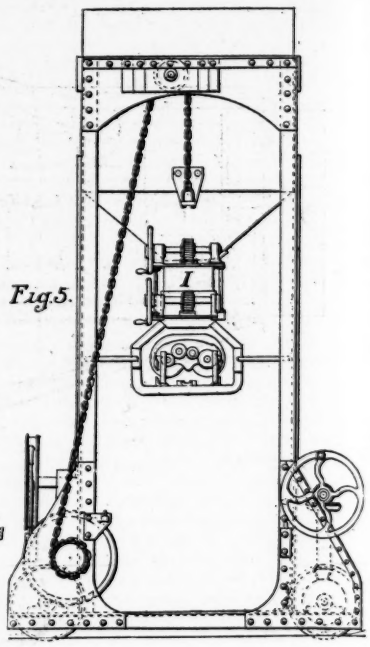


Fig. 5.

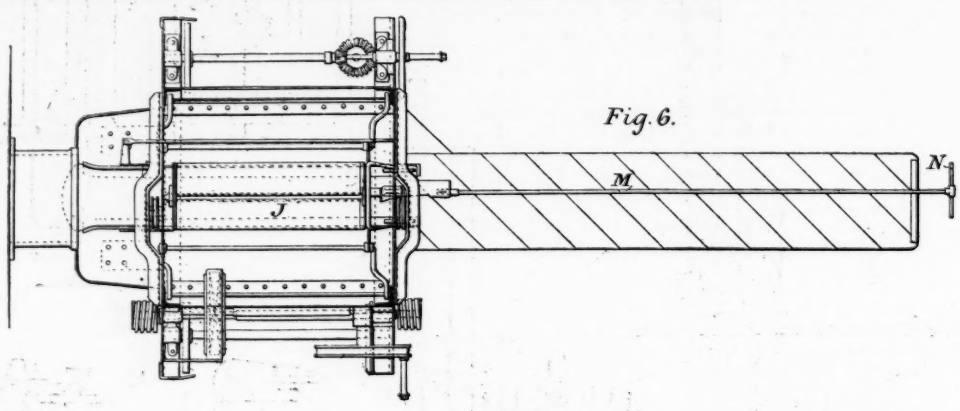


Fig. 6.

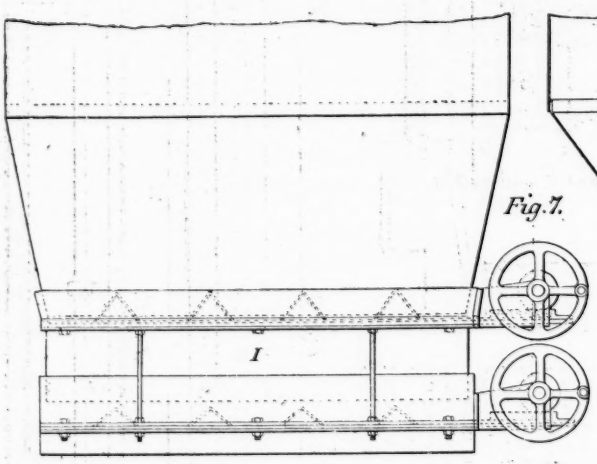


Fig. 7.

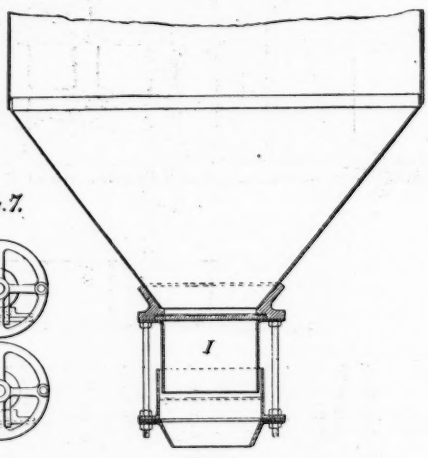


Fig. 8.

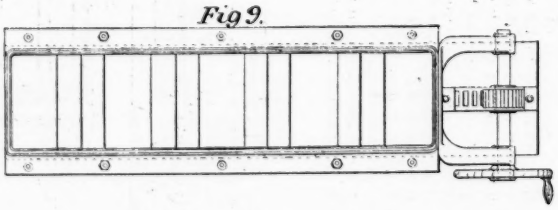


Fig. 9.

the top set of doors is opened for supplying the chamber, the bottom set is closed, and when the bottom set is open to supply the charger, the top set is closed to prevent coal entering the measuring-chamber.

The charging-machine consists of a travelling trolley carrying the coal-hopper, measuring-chamber, and charger, as well as the mechanism for travelling the machine along the retort-house, adjusting the charger to the tiers of retorts to be charged, and driving the charger in and out of the retort. This latter may be driven either by manual power or by compressed air, steam, or other suitable power, for giving the charger the amount of travel necessary for sending it in and out of the retorts and reversing the scoops.

Fig. 1 is a side view of a power-driven charging-machine; fig. 2,

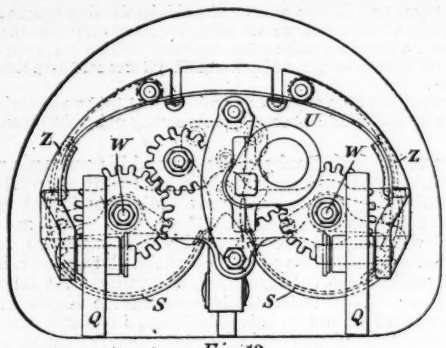


Fig. 12.

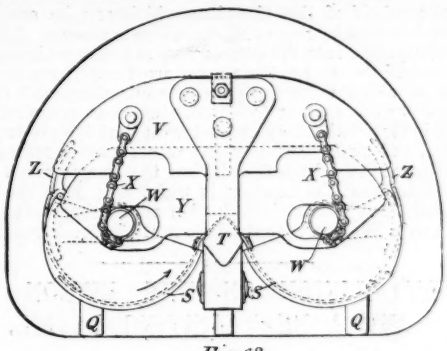


Fig. 13.

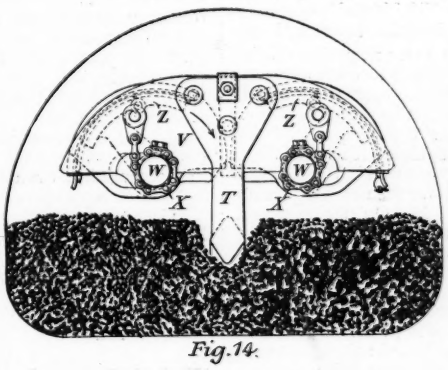


Fig. 14.

an end elevation; and fig. 3 a plan of the machine. Figs. 4, 5, and 6 are similar views of a manual-driven charging-machine. Fig. 7 is a side elevation of a coal-hopper and measuring-chamber, adapted to either type of machine. Fig. 8 is an end elevation of the coal-hopper and measuring-chamber; and fig. 9 is a plan of the measuring-chamber. Fig. 10 is a side elevation of the charger, and fig. 11 is a plan of same. Fig. 12 is an end view of it, showing the gearing for reversing the scoops; and fig. 13 is an end view, but showing the scoops in position for receiving the coal from the hopper and measuring-chamber previous to being driven into the retort, and also the mechanism which comes into operation for raising the scoop-ends when the scoops are reversed. Fig. 14 is an end view of the charger in the retort, with the scoops reversed and raised—the coal having been deposited in the retort.

Referring, now, to figs. 1 to 6, either form of charging-machine consists of an upright frame carried by travelling wheels running upon rails laid parallel with the retort-bench. The machine may be propelled along the retort-house by a motor driving the gear-wheels connected with the travelling wheels, or by hand-wheel and gearing.

Within the uprights of the charging-machine frame there is a coal-hopper which may be raised and lowered by chains, and gearing driven by the motor or by hand hoisting-gear; and to the lower part of the hopper there is a measuring-chamber I, which receives the coal from the hopper and delivers it to the charger J, which is carried by a frame suspended from the hopper. In the power-driven machine, the frame in which the charger is carried consists of side guide-bars K, in which the turnover gear-carriage L runs forwards and backwards when the charger is driven in and out of the retort. This is for the purpose of conveying the coal into, and depositing it on the floor of, the retort. The frame K also carries rails at one end, for the purpose of supporting the charger J when it is out of the retort and on the machine (in the position for receiving its supply of coal from the measuring-chamber). The carriage L contains the mechanism for giving rotatory motion to the charger-rod M connected with the gear shown in fig. 12 of one end of the charger.

Any suitable means for driving the carriage forwards and backwards along the frame K (and consequently the charger J in and out of the retort) may be employed. In the power-machine shown, this is effected by a cylinder motor containing a piston, which may be driven forwards and backwards in the cylinder by compressed air, steam, or water under pressure; the motive power being directed into the cylinder and exhausted from it by a valve actuated by rods and levers, with a hand-lever under the control of the attendant working the machine. The piston of the cylinder motor drives a piston-rod and rack driving a pinion attached to a shaft on which is fixed a chain-drum. This chain-drum has two chains—one leading to one end of the frame K, and one to the other end, where they pass round pulleys, and are then attached to a double chain-pulley O fixed to the rod M. These chains are so passed round the double chain-pulley that they will rotate the rod M when required for reversing the scoops, or bringing them back into position for refilling with coal; and suitable stops on the double chain-pulley will be provided so as to fix the degree through which the pulley will be rotated. Also at the required positions on the frame, stops are fixed, against which the carriage L will stop; and the stroke of the charger will thereby be definitely regulated. These stops connect to, and release, a pawl holding the double chain-pulley in the position required according to the position of the scoops in the charger. The pawl is fitted to the carriage L; and when it arrives at the limit of its stroke (either when going in the retort the first or last time), it drops by its weight in front of one of the small fixed projections fitted on the top of the frame.

Before the charger is withdrawn from the retort, the scoops have to be reversed by the pulling-out chain giving a revolution to the double chain-pulley O, when the pulley comes against a stop, and the continued further dragging of the chain pulls the charger out of the retort.

It may happen, says the patentee, that the power required for reversing the scoops will be in excess of that necessary for pulling the charger out of the retort; and consequently the charger would be withdrawn from the retort without being reversed. This is prevented by means of a pawl which drops over one of the two fixed projections; and the charger cannot then be withdrawn until the pawl is raised over it. This is done by a projection on the side of the double pulley coming in contact with the mechanism connected with the pawl after the pulley has revolved the extent required, which raises the pawl and allows the charger to be withdrawn.

In a short retort, the charger may only require to make one stroke in and out of the retort to charge it. But generally two strokes will be required; and in this case an intermediate stop for the carriage L may be provided.

In the manual charging-machine, the charger is driven in and out of the retort by a rod having a lever-handle N, which, when rotated by the attendant, causes the gearing at the end of the scoops to reverse them.

For making a connection between a charging-machine and the retort (to allow the charger to be run into the retort), a hinged drawbridge is provided, which is lifted clear of the mouthpiece by means of a rod and lever when passing from one retort to the other.

The charger J is drawn to a larger scale in figs. 10 to 14, and is exactly similar for both the manual and power-driven machines. It consists of a carriage supported on three wheels P, Q, and R. The carriage supports two semi-circular scoops S, and has a centre-bar or backbone T, with plates U and V at the ends, for carrying the ends of the scoop-shafts W. The end-plate V (which enters the retort first) has two suspended chains X, fixed at one end to the plate and at the other end to the sides of the scoop-shaft ends; so that when the scoops partly revolve, the scoop-shafts W will wind on to the chains—as shown in fig. 14—and the scoops will thus be raised during the operation of emptying the coal on the floor of the retort. When the scoops are reversed, they will be higher from the bottom of the retort than if they worked round a fixed centre. The moveable guide-plate Y is between the scoop-ends and the back-plate V; and when the scoops are being reversed, it works up and down vertically, and is free to adjust itself to the position of the scoops.

Each scoop consists of two parts; and when they are being reversed, one part slides within the other concentrically by the rotation of the shaft W. After it has made a portion of a revolution and is working inside the part S (which is kept stationary by its own weight, or by its own weight and the weight of the coal lying in it), the edge of the other part comes into contact with stops fixed to the part S; and then the continued motion of the second part causes both parts together with the hinged extension-pieces Z—forming the complete scoop—to reverse until it arrives in the position shown in fig. 14. When they are in the position shown in figs. 12 and 13 (which is the position they are in ready for receiving the supply of coal from the measuring-chamber), the scoops, with the hinged extension-pieces, are opened out to form two wide scoops side by side.

Having described the mechanism both for manual and power-driven charging-machines, it is only now necessary to notice the operation of charging a retort with coal. The machine is brought opposite the retort to be charged, and the charger adjusted in height to suit the height of the retort. Then the drawbridge is lowered by a hand-lever and rod to rest on the bottom of the retort-mouthpiece—thus connecting a path for the charger J to run into the retort. The top slide-door of the measuring-chamber is next opened, allowing coal to fall from the hopper into the measuring-chamber I. The top slide-door is then closed; and the bottom slide-door is opened—allowing the coal to fall from the measuring-chamber into the charger J. The quantity of coal contained in the measuring-chamber is regulated by the position of

the bottom half of the chamber, which can be contracted or increased in area by means of the adjusting bolts. The charger is then propelled into the retort; and the charger having arrived at the end of its stroke, the scoops are turned over by revolving the rod M which turns the gearing connecting with the scoops, and reverses them so as to deposit the coal in the retort. The charger is then withdrawn, refilled with coal from the measuring-chamber, and again sent into the retort until it meets the layer of coal previously deposited. Then the scoops are reversed as before described; the charger is withdrawn from the retort on to the machine; and the drawbridge connecting the path for the charger with the retort is raised clear of the retort-mouthpiece.

EXPERT OPINION ON THE KITSON LIGHT, AND A NEW IGNITING DEVICE.

We have had indications on more than one occasion of a little proneness on the part of some gas authorities to regard the Kitson high-power incandescent oil-lamp as a competitor in the strictest sense of the word; but we are inclined to think they are mistaken. On its first introduction in this country, we hailed the light rather as an ally which would materially assist the forces of the gas industry not only in stemming the progress of our much-favoured rival electricity, but in displacing it in the affections of local and other authorities. This view we have continued to hold, and have not up to the present time seen or heard anything which has even in one tittle altered it. On the contrary, we have heard from the lips of gas men encomiums regarding the general character of the light which were alone sufficient to justify anything concerning it which has appeared in these columns; and now we have had brought to our attention a report on the light by Professor Vivian B. Lewes and Dr. Boverton Redwood which makes the justification complete. Facts and statements to which men of the standing in the scientific world of the two reporters have appended their names will be perused with diligence; and everyone who reads will be able, from the clear exposition of the results of the investigations, to see that the light has merits of a value too great to be treated with disdain or lightly set aside. Beyond this, comment is not required. The report bears the date of the 5th ult.; and it is given here *in extenso*—

It has long been recognized that, in the combustion of petroleum for illuminating purposes, advantages similar to those obtained in the use of gas would result from the employment of an incandescent mantle; and many attempts have been made to construct a suitable lamp for the purpose. In the Kitson light, the difficulties which have stood in the way of the use of mineral oil in a mantle-lamp have been successfully overcome by the simple device of obtaining oil vapour under sufficient pressure to ensure its drawing up an ample supply of air for its complete combustion in a burner of the Bunsen type, and so enabling the high calorific value of the oil to be fully utilized in the most efficient way—a system of illuminating large spaces being thus provided which, in respect of efficiency and economy, surpasses every other means of lighting.

In a long series of experiments made with various types of the Kitson lamp, it was found that the average illuminating power was slightly over 1000 candles; and although, with a new mantle of perfect fit and with full pressure in the reservoir, it was possible to obtain values as high as 1250 and even 1350 candles, yet in ordinary work 1000 was the fair mean result, over extended periods of time. The colour of the light more nearly approximates to that of daylight than is the case either with the mantle as ordinarily used or the electric arc.

In these experiments the consumption of oil averaged 0·1 gallon of oil per 1000 candles per hour.

The light-emitting power of the mantles used was not affected to a greater extent than with any pressure system of gas-incandescent lighting; a mantle which at the start was giving a light of 1200-candle power still yielding 1000 candles after 30 hours' burning.

The candle power of the light emitted by the mantle varies directly as the pressure of the oil reservoir; and although this makes a considerable difference with a small reservoir, with the size used for street lighting it only means a fall of from 1200 to 1000 candles in 24 hours—a difference not distinguishable by the eye in ordinary practice.

The pressure in the apparatus up to the point of emission of the oil vapour is practically the same as in the reservoir; but at the burner-head this is reduced to atmospheric pressure.

In the gasifying, or more properly vaporizing, tube which receives the heat escaping above the mantles, and utilizes it in converting the oil into vapour, the temperature just falls short of that necessary to decompose the oil, with the result that the amount of carbonaceous matter deposited in the tube is extremely small; being only 0·226 grammes in 18 hours.

The working parts of the lamp are so arranged as to admit of the use of a downward reflector, which does away with the trouble so common in incandescent lighting of the largest amount of light being emitted upwards at angles above the horizontal, with the result that the Kitson lamp gives its maximum between angles of 10° and 30° below horizontal, and is still giving very nearly its horizontal efficiency at 40° to 45° below, which may be taken as the important working angles.

Except at the moment when vaporization of the oil commences on the lamp being lighted, we find that the combustion is so perfect that the products of combustion are odourless.

We have given special attention to the question of the safety of the system, in view of the circumstance that the oil is supplied to the lamp under pressure; and we have arrived at the conclusion that the system is not only adapted for use in the lighting of large areas in the open air, but can also be safely employed as a source of light in railway stations, factories, and other buildings. It is, of course, obvious that safety is a relative term, and that no system of artificial lighting can be entirely free from risk of fire; but we are of opinion not only that the Kitson system may be regarded as the safest means of obtaining a given amount of light from mineral oil, but also that it is not less safe than the electric light or gas.

The portability of the apparatus, and the fact that no disturbance of the ground in fitting it is necessary, are strong points in favour of the system.

The terms in which Professor Lewes and his colleague refer to the efficiency of the light are very definite; and the careful reader will be particularly struck by the concluding portion of the final sentence of the first paragraph. The words which are found there will, we imagine, put our gas-lighting engineers on their mettle. Some of them may even feel inclined to offer criticisms on the report in these columns; for, while we do not retract the designation of "ally" which we have given the Kitson light, we are not so blind as not to recognize that, in places where gas-mains exist, it is a competitor of the high-power lighting systems which obtain their incandescing power from gas. Regarded from that standpoint, the makers will, upon the foregoing report, critically examine the Kitson arrangement, and compare it with their own productions from every side—cost, efficiency, reliability, convenience, &c., and see whether, if they find they must admit there are points of superiority in the Kitson lamp, there are not also points of inferiority which, in a place supplied with gas, would put it out of the running. Mr. Kitson himself maintains that the working cost of the lamp is so low that it would pay gas companies, even where gas-pipes exist, to adopt it for the lighting of large open spaces. On this head a report which Mr. E. C. Sayer, the Gas Examiner of Ipswich, presented to the Mayor in November last affords further information. He compares the cost of electric arc lighting, incandescent gas lighting, and the Kitson incandescent lamp, and constructs from his results the following table:—

—	Average Mean Candle Power.	Hours.	Cost.
Electric arc	600	4852	£32 14s. 6d.
Incandescent gas. . .	700	4852	£26 6s. 8d. (at 2s. 10d. per 1000)
Kitson incandescent oil-lamp	1000	4875	£16 5s. 0d.

Taking these figures as accurate, it is found that the cost to obtain 1000-candle power illumination for 4875 hours is: With the electric arc, £54 16s., or 3·372 times the cost of the Kitson lamp, or 2·7d. per 1000-candle power per hour. With incandescent gas, £34 6s. 1d., or 2·111 times the cost of the Kitson lamp, or 1·7d. per 1000-candle power per hour. With the Kitson lamp, £16 5s., or 0·8d. exactly per 1000-candle power per hour.

Since we last supplied our readers with information received as to the progress of the system, we learn that it has been applied to some additional large works and railways, and rather considerable extensions have been made at the works of Messrs. Vickers, Sons, and Maxim, at Erith. Trial installations are also to be seen in Whitehall and at the foot of Blackfriars Bridge. Besides large-space lighting, the lamp has been tested for other purposes—notably for lighthouse and photographic work—with successful results. The great photometric value or actinism of the light, combined with its purity, renders it very useful in photography; a clear and well-defined view of one of the machine shops of the North-Eastern Marine Engineering Company at Sunderland, taken at 8 p.m. on Nov. 21 last by means of the light, is convincing on this point. In regard to the use of the system for lighthouse purposes, the first "Note" in last week's "JOURNAL" (p. 270) bears witness to its value, although it was not then made sufficiently clear that the light referred to was the Kitson. Mr. John R. Wigham, of lighthouse fame, is actively interesting himself in obtaining its introduction for aiding and protecting those who "go down to the sea in ships."

An ingenious device has lately been added to the system, for facilitating the preliminary heating and lighting of the lamp. In any convenient place (in a lamp-post outfit in the base containing the oil-tank) a small hermetically closed can holding petroleum ether in absorption is connected by fine copper tubing to a burner placed directly under the vaporizing-tube. The carburetted air is forced up to the lamp by means of a small rubber bulb, and ignited by a platinum wire heated electrically. The flame, thus produced, plays along the entire length of the vaporizing-tube, heating it rapidly, and at the same time igniting the oil vapour rising within the mantles. This system of igniting obviates any necessity to climb up to the lamps, or use either torches or spirit lamps, and can be installed where neither gas nor electricity is available; the entire additional outfit requiring but a minimum of space.

The "marine torch" which was tried off Westminster pier towards the close of the past year, as mentioned in the "JOURNAL" for Dec. 11, was employed last week in lighting up the offices of the "Pall Mall Gazette." The appliance is a metal cylinder containing a wire basket in which carbide of calcium is placed, and this, on water being applied, gives off acetylene gas. The cylinder also contains an air chamber in order to give the necessary buoyancy to the torch.

REGISTER OF PATENTS.

Charging-Machine for Gas-Retorts.—West, J., of Didsbury, near Manchester. No. 1097; Jan. 17, 1900.

A full illustrated description of the plant referred to in this patent specification appears under the heading of "Technical Record" to-day, p. 335.

Production of Water-Gas.—Boult, A. J.; a communication from Emil Fleischer, of Dresden. No. 1959; Jan. 31, 1900.

It is pointed out by the patentee that "it has often been proposed to employ bituminous coal for the production of water gas, and thereby to take advantage of the advantageous properties of this kind of fuel—advantageous not only from the point of view of economy, but also by reason of its products of distillation, which are capable of enriching the water gas produced. Until now, however, the process has not been carried out practically, especially as regards continuous production. The chief cause of failure has been found to be in the fact that this kind of fuel becomes caked in the generator, and (owing to its swelling and becoming spongy) forms a hard layer which does not sink subsequently in the generator, and prevents the gases generated from passing through—thereby necessitating the stoppage of further charging of the generator with coal, and an interruption of the working. Another drawback is that during the time of heating the generator, by means of a hot blast, the products of distillation during the whole blast-period pass away undecomposed, together with the products of combustion."

Attempts have been made to avoid these drawbacks by connecting the generator with a retort or similar device, in which the heat generated is used for coking the fuel, so that only coked or half-coked material descends in the generator proper. The present process is said to be based on experiments made with this material in a method described in patent No. 29,863 of 1896, carried out in the otherwise well-known arrangement of twin generators, into which the bituminous coal is delivered in a suitable manner.

It is stated in the 1896 patent that the time proportion between the blast-period and the gas-period has been entirely changed and reversed, as compared with previous methods of working. Whereas formerly 15 to 20 minutes were required for the hot blast, and only 4 to 6 minutes were available for the production of gas, the proportion as regards time is reversed in the Dellwik process—only 3 to 4 minutes being required for the purpose of the hot blast, while 12 to 15 minutes are available for the production of gas.

The twin generators are worked in the usual manner—*i.e.*, the injected steam is caused to rise through one generator and the products of decomposition, and the gases produced there pass into the other generator, travelling downwards through the latter—the water gas produced being drawn off below the grate.

If, in this process, the generator into which steam is first injected (the steam receiving generator) is charged with coal each time before the gas-period, the hot gases will pass through it during the whole time of the gas-period, and thereby produce an "energetic distillation." This is also specially favoured by the fact that, in the process according to the 1896 patent, the whole of the heat is more evenly distributed in the generator—*i.e.*, is higher in the upper portions than in the case of other generators; the heat acting directly through contact and radiation on the fresh coal.

This distillation is sufficient to deprive the coal of its caking properties during a single gas-period; and, of course, in most cases only part of the distillable portions will be obtained. But complete distillation is not required in order to meet the drawbacks already mentioned. A further distillation takes place during the subsequent blast-period, the products of which distillation pass off with the combustion gases—a drawback which, it is said, considering the short duration of this period, is of only small importance.

The products of distillation pass, during the whole gas-period, together with the water gas produced, in the usual manner, through the second generator, in which they are decomposed so as to form a uniform product. Eventually, there may take place a further reaction in this generator of undecomposed remnants of steam.

Desulphurizing Sulphuretted Hydrogen.—Dewrance, J., of Great Dover Street, and Paul, J. H., of Charlton. No. 2146; Feb. 2, 1900.

Assuming that their invention is applied to the purification of coal gas, the patentees propose to proceed as follows: Sawdust or equivalent porous material is saturated with a solution of some soluble ferric salt—such as sulphate or chloride. The material so saturated is treated with ammonia or ammoniacal gas, or with a hydrate of an alkaline earth—in the latter case, in conjunction with ferric chloride. The result is that the ferric salt is decomposed; and sulphate or chloride of ammonia (or of the other base employed) is formed, and hydrated oxide of iron deposited. The ammoniacal or other alkaline salt is then washed out; and the hydrated oxide of iron, in a fine state of division, remains as a deposit among the sawdust.

Having placed this mixture upon the trays of a purifier, the gas is passed through it, with the result that water and ferrous sulphide are formed. When the sawdust charged with oxide of iron ceases to absorb sulphur from the gas, the material is removed from the purifier, moistened to prevent its taking fire, and exposed for a few days to the air. The iron thereupon absorbs oxygen from the atmosphere, and reverts from the sulphide to the oxide condition. It may then be further used in the purifier until the proportion of sulphur absorbed from the gas has reached a certain standard.

For the ferric sulphate or chloride, ferrous sulphate or chloride may be substituted; but, under these circumstances, the iron-charged absorbent material, after having been washed for the purpose of removing the ammoniacal salt, should be exposed to the atmosphere or otherwise oxygenated prior to being placed in the purifier.

As a result of this improved method of procedure, the sawdust is said to become "thoroughly impregnated with hydrated oxide of iron, as distinguished from being merely covered with a superficial coating of the powdered oxide, with the effect that the desulphurization of the coal gas, or other gas containing sulphuretted hydrogen, is rendered more complete than heretofore."

Gas-Stoves.—Oehme, R., of Brussels. No. 2989; Feb. 14, 1900.

This invention refers to gas heating-stoves designed so as to permit of easy and speedy cleaning of the gas-outlet orifices, to facilitate the replacing of parts damaged by burning, and also of forming "a large plain surface serving to store and regulate the heat emitted by the stove." Broadly speaking, the stove is made of a series of rings of taper section fitting one against or within another. The rings are provided with a number of notches at their periphery and inner edges, which serve as gas-outlets. When it is required to clean the orifices, the rings can be taken apart one by one; they can also be easily examined and replaced without renewing the entire stove.

Manufacture of Incandescent Mantle Fabric.—Radclyffe, D. E., of Gloucester Crescent, N.W. No. 3323; Feb. 20, 1900.

The patentee proposes to employ as the fabric for use in incandescent gas-mantles the fibres of the plants *genera* Urtica or Bœhmeria (known as ramie, rhea, or China grass), but advantageously the latter. No claim is made for the manner in which the fibre is prepared, combed, spun, and woven in making mantles; but the patentee does assert that, by the employment of the "aforesaid particular fibres," many advantages are obtained. These, however, are not specified.

Gas-Producers.—Duff, E. J., of Liverpool. No. 3631; Feb. 24, 1900.

This invention relates to the making of gas-producers such as are described in patent No. 7467 of 1893, so as to lessen the cost of their construction, and increase their durability and efficiency.

The producer described in the 1893 specification was made with rectangular sides lined with fire-brick; and the air for combustion or gasification entered up among the coals from a bottom casing through perforated plates or gratings, inclined up from the sides to a central angular ridge. According to the present invention, instead of these inclined gratings, the patentee proposes to employ a casting without gratings or perforations, and extending across the producer, and either curved or angular in cross section. This casting may be built into, and carried by, the side walls at opposite sides; or it may be supported by a wall of narrower width than the casting extending under it. The usual water dish or seal is formed underneath the producer, having a trough or opening extending along at opposite sides parallel with the sides of the casting. The air for combustion passes from the underside of the casting beneath its lower edges, and up among the coals; the lower edges being at some height above the water-level. The ashes descend into the water, and are removed through the troughs or openings by rakes as usual.

Important advantages are said to be obtained from the use of these improvements. A grate-casing or fuel-receiving part made with perforations or gratings as described in the earlier specification, is, it is said, found to be unsuitable where the gas is being generated with a view to the recovery of ammonia. In such cases, a large quantity of steam is used along with the entering air; and the excess of steam moistens the fuel-dust falling through the perforations—causing it to adhere to the gratings, and resulting eventually in the choking and rusting up of the air-passages. By the use of the improved casting or casing as described, no choking of the parts can take place, as the air passages and parts are so constructed and arranged that there is no tendency for the fuel-dust to adhere to the sides and block up the air-openings. A great advantage is also gained in ammonia gas-producers by blowing the air into the fuel-bed at a point immediately above the water in the trough, as a greater height of fuel is presented for the steam-laden air to pass through in its upward course through the fuel-bed, "and thus the steam is better broken up and the amount of carbonic acid formed in the resultant gas is thereby reduced—the higher blast pressure used in ammonia gas-producers enabling the air to be sufficiently distributed throughout the fuel-bed."

Carburettor for Coal Gas.—Tully, C. B., of Sligo. No. 4134; March 5, 1900.

The primary object of this invention is (in the words of the patentee) "to simplify the process of enriching or carburetting coal, water, or other gases for illuminating purposes, by the addition to them of the vapours of naphtha, benzol, or other suitable light fluid hydrocarbon, and to construct a simple and self-contained carburettor or gas-enriching apparatus for carrying out the process."

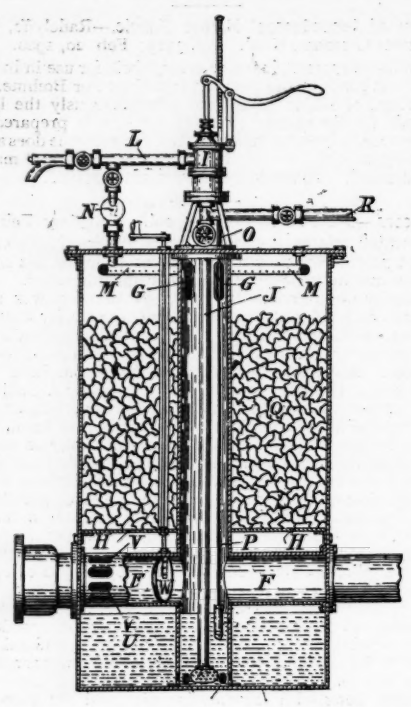
The arrangement proposed is that described, in general terms, by the inventor at the meeting last year of the North of Ireland Association of Gas Managers—see "JOURNAL" for Aug. 21, p. 470. The lettered drawing attached to the patent specification, however, enables some further details of the plant to be given to-day.

The closed chamber shown on p. 340 is made of wrought iron or steel plate, and of cylindrical form (its axis being vertical); and the joints throughout are made "with any suitable material insoluble in the hydrocarbon to be employed." Within the chamber is a central pipe C flanged at both ends—the bottom flange resting upon the bottom of the chamber, and the top one jointed to the under side of the cover. Openings are made in the lower part of this vertical pipe immediately above its bottom flange. At any convenient point in the height of the gas-pipe, branches F are formed—preferably at right angles to it, and of such lengths as to allow of the flanged ends being bolted (in connection with a socket and spigot on the exterior of the chamber) tight as against gas and light hydrocarbons. The upper end of the pipe is pierced with a series of slots or openings G of an area suitable to the quantity of gas to be treated. A perforated diaphragm H rests above and close to the gas-branch F. A force-pump I is fixed to the plate closing the opening in the chamber-cover. The suction-pipe from the pump passes inside the vertical gas-pipe to within a short distance of the bottom of the chamber, where it is preferably furnished with a strainer. The delivery-pipe L from the pump passes through the cover of the chamber to a spraying device M attached to the under side of the cover. On the delivery-pipe of the force-pump is a tell-tale device N, to enable the attendant to see if the pump is drawing and delivering the hydrocarbon properly.

The upper part of the chamber is loosely packed with coke or other porous absorbent material, resting upon the diaphragm or grating H.

The upper surface of this absorbent bed is kept below the openings G in the upper part of the vertical pipe, and may be covered, if preferred, by a grid or grating.

Hydrocarbon fluid is passed into the tank or reservoir U from any external source of supply, along the pipe R, and forced into the spraying-device M, from which it is delivered in a finely-divided state on to the upper surface of the absorbent bed Q, which soon becomes thoroughly saturated, when the surplus fluid flows through the perforated diaphragm H into the tank, until the float, by means of the pointer and scale on the pipe R1, indicates that the fluid is at its normal level. On ascertaining this, the cock is closed. The gas to be enriched



is admitted through the socket at the left, but may also be admitted through the spigot at the right leading to the internal vertical gas-pipe direct. In the former instance, the gas passes upwards through the slots V and the saturated absorbent bed Q, taking up in its passage the vapour from the hydrocarbon. The enriched gas then travels through the upper openings G in the central pipe, then downwards, and thence away from the apparatus through the gas-branch F. When the gas is admitted through the branch F, it passes upwards through the central pipe and the slots G in its upper end; thence downwards through the saturated bed Q, and out of the carburettor through the openings V. The stop-valve W, actuated by a winch, is for use when it is desirable to allow the gas to pass through the carburettor without entering the enriching chamber.

APPLICATIONS FOR LETTERS PATENT.

1300.—Maltby, H. E., and Ratcliffe, H., "Repairing water or gas mains under pressure." Jan. 21.
1319.—Baines, H. C., "Internal combustion engines." Jan. 21.
1344.—Hughes, G. H., "Internal combustion engines." Jan. 21.
1372.—Wedderburn, J. W., "Gas or other meters." Jan. 21.
1380.—Hookham, G., "Water-meters." Jan. 21.
1417.—Belton, J. C., "Automatic relief apparatus for hydraulic mains." Jan. 22.
1473.—Sugg, W. T., "Incandescent gas-burners." Jan. 22.
1493.—West, J., "Charging inclined gas-retorts." Jan. 22.
1519.—The Hygienic Stove Company, Ltd., and Greenwood, E. P., "Gas cooking ranges or ovens." Jan.23.
1525.—Ward, J. W., "Burners for incandescent gas lighting." Jan. 23.
1595.—Boult, A. J., "Gas-burners." A communication from M. Vieu. Jan. 23.
1643.—Jolly, C., "Gas and like engines." Jan. 24.
1683.—Thorn and Hoddle Acetylene Company, Ltd., and Hoddle, C., "Generating acetylene gas." Jan. 24.
1692-3.—Roovers, L., "Gas-heated baths." Jan. 24.
1702.—The Gas-Meter Company, Ltd., and Gow, J., "Prepayment gas-meters." Jan. 24.
1703.—Bennett, F. M., and Fowler, J. O., jun., "Producing perfect combustion of gas." Jan. 24.
1739.—Tatham, E., "Fluid pressure-regulators." Jan. 25.
1740.—Robertson, W., "Lamps." Jan. 25.
1741.—Robinson, C., "Speed adjusting devices for fluid pressure engines." Jan. 25.
1770.—Sefton-Jones, H., "Automatic gas igniting or extinguishing pressure device." A communication from C. Fader. Jan. 25.
1789.—Aitken, H., "Utilization of naphthalene for illuminating and heating purposes." Jan. 25.
1807.—Pattison, R., "Shades for gas or other lights." Jan. 26.
1823.—Gluth, C., "Supports for incandescent mantles." Jan. 26.
1839.—Naef, P., "Fluid-pressure motors." Jan. 26.
1843.—Naef, P., "Fluid-pressure motors." Jan. 26.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Electrolysis of Gas and Water Pipes.

Sir,—A new and serious danger threatens gas and water undertakings. Unless preventive measures are promptly taken, they will in a few years find their mains and pipes, in all towns of any importance, in the corroded condition of those in many American towns, from what is known as "electrolysis." The mischief has already begun here; and, with the great extension of electric railways and tramways that is imminent, prompt action is necessary. The object of this letter is to enlist the active assistance of gas and water works engineers in an effort that is being made to obtain protection.

The evil to be guarded against is the escape of the return electric currents from the rails to gas and water pipes. Wherever such currents leave these pipes—they do no harm in entering—a definite quantity of iron is carried away into the soil, resulting in time in absolute perforation of the metal. The resulting escapes, to say nothing of the loss, are great sources of danger, because the eating away of the pipe occurs in unknown places, and cannot be discovered, except by accident, until the mischief is done.

The London Gas and Water Companies are taking action, separately at present, but with the intention of uniting their forces. Their first difficulty, however, is to obtain evidence of electrolytic action on their pipes, The Central Electric Railway (the "twopenny tube") has not been in existence long enough to produce much effect, so far as is known, and there is only one other electric railway in London—the City and Clapham—which has been at work longer. This runs through the district supplied by the Lambeth Water Company and the South Metropolitan Gas Company; and these Companies, having found injury to their pipes, were the only opponents last year to the Bills for promoting electric traction in London. After much effort, they got protection of a kind, which eminent electricians say is of no real use. They were, in effect, told they were crying out before they were hurt; and it was only when the Bills passed to the second House that they were listened to—having been able, in the meantime, to find and to show specimens of electrolytic action on their pipes.

The three London Gas Companies have jointly obtained the assistance of Professor Dewar, F.R.S., of the Royal Institution, and of two eminent electricians—viz., Professor Perry, F.R.S., President of the Institution of Electrical Engineers, and Professor Ayrton, F.R.S., a Past-President. These gentlemen tell us that, in order to obtain the required protection, it is necessary to prove that mischief is being done. May I, therefore, ask all those engineers who have electric tramways in their districts to make early search for electrolytic action on their pipes, and, if found, kindly communicate with our Chief Engineer, Mr. C. C. Carpenter, without delay. Or in the case of water, they may send to Mr. Walter Hunter, of No. 17, Victoria Street, Westminster, the Engineering Director of the Grand Junction Water Company, and Joint Engineer of the Staines reservoirs scheme, who will be glad to receive information. The reason for this application for assistance is that the Board of Trade consider that the regulations formulated by them as the result of an inquiry by a Parliamentary Committee in 1893 are sufficient. By those regulations, the electric current escaping to the gas and water pipes is not to exceed a certain quantity; and the Board of Trade appear to believe that where their regulations are in force no harm is being done. Professor Perry says these regulations will not prevent damage. If, therefore, cases of electrolysis can be found where these regulations are in force, the evidence will be doubly valuable.

The electricians take a very serious view of the danger; and your pages, and those of the electrical papers, have given some striking evidence of the havoc wrought in America. It is proposed shortly to summon a meeting of the Committee of the Gas Companies' Protection Association to take action in the matter; but the pressing need of the moment is evidence of damage.

George Livesey.

South Metropolitan Gas Company,
Old Kent Road, Jan. 31, 1901.

The Gaslight and Coke Company's Report.

Sir,—The report of the Directors of the Gaslight and Coke Company, just to hand, contains one or two statements of such an extraordinary character that I feel constrained, as far as may be possible through the medium of the "Journal," to call the attention of the shareholders to them before the meeting on Feb. 8, at which they will be asked to sanction and approve them.

First we have the statement of fact, that there is a falling-off in the sales of gas of 6 per cent. We are then told that, since the last meeting, the Company have obtained over £150,000 of additional capital; and, notwithstanding this, they propose to promote a Bill in the next session of Parliament for power to raise £1,000,000 in debenture stock. What the Company want thls extra capital for, with a waning consumption, the Directors do not condescend to explain; and I am sure no ordinary business man could ever divine. But the most astounding proposal has yet to come—that is, to repay this debenture stock out of the profits due from time to time to the ordinary stockholder. If this does not disturb the complacent equanimity of the ordinary stockholder, I do not know what will.

The following figures bear on the relation of capital to gas production in some leading instances:—

Capital Charges per 1000 Cubic Feet of Gas Sold.

Name.	Pence.
Gaslight and Coke Company	11·835
South Metropolitan Gas Company	8·113
Commercial Gas Company	9·914
Crystal Palace Gas Company	7·514
Newcastle and Gateshead Gas Company	7·571
Edinburgh and Leith Corporations	8·206
Manchester Corporation	3·950
Glasgow Corporation	3·501

From these figures it will be seen that, compared with other large

undertakings, the Gaslight and Coke Company is very much over-capitalized at present.

It is often the fashion among gas-makers to sneer and poke fun at the Manchester management, because they take large sums of profit for the relief of rates. Manchester might be much better managed, I admit; but, compared with the feeble administration of the Gaslight and Coke Company, as indicated by the above figures and the current report, it comes out quite brilliant.

In the fifth paragraph of the Directors' report, it is stated that extra money has been spent on wear and tear account, which will "produce economy in working." What inference may be drawn as to previous practice in this regard, is difficult to say. It may in some measure explain the high capital charges.

If Mr. George Livesey were appointed a Director at the next meeting, Gaslight and Coke stock would advance from 5 to 10 per cent. on that information alone. The Directors would then be able to issue their ordinary stock at a premium, which would dispense with the necessity of a Bill in Parliament, if it did not show that there was more than sufficient capital already accumulated to do all the work required.

Although the meeting is called (figuratively speaking) in an inaccessible place and at an impossible time for business people, still I do hope that the stockholders will arise from their lethargy, and condemn the action of the Board on this occasion at all events.

WM. CARR.

Stalybridge, Jan. 30, 1901.

The Picturesque in Gas-Works Construction.

SIR,—I saw in that capital little paper the "Daily Express," the illustrations reproduced in your last issue, but took them merely for fancy sketches. I wrote a letter to the Editor to say that in *theory* the thing looked very pretty; but in practice the consumers of gas would look anything but pretty—if they had to pay 5s. or 6s., instead of 2s. 6d. or 3s. per 1000 cubic feet. I added that I believed not one consumer in a thousand ever went over a gas-works.

MAGNUS OHREN.

Forest Hill, S.E., Jan. 31, 1901.

Acetylene Lighting.

SIR,—A great number of papers have lately been treating us to the lecture (to which we are now becoming accustomed) of Germany's easy commercial supremacy; and they give as example the progress made there in acetylene lighting, as evidenced by the report of Dr. Rose, H.B.M's. Consul at Stuttgart. You gave copious extracts from the report in the "JOURNAL" for Dec. 18 and 25. Such lectures usually do harm to our national industry, inasmuch as they tend to lead foreign buyers to look to Germany rather than to this country as the best and most up-to-date place to cover their requirements. I trust, therefore, you will allow me space to point out that, on the whole, Germany is emphatically not ahead of this country in respect to acetylene lighting.

As regards, in the first place, the statements made that Germany has, as usual, led the way, &c., let me point out that acetylene was discovered by an Englishman, Edmund Davey. Calcium carbide again (the raw material for making acetylene) was first manufactured in the electric furnace in London in 1891; and the first exhaustive treatise on its manufacture and properties was published in France, not in Germany.

Nor can the latter country, at the present time, lay claim to possessing the largest European carbide works, or the greatest number. The largest belong to my Company, the Ciffre Electro-Chemical and Power Company, Limited, of London; and France has more power employed in carbide manufacture than any other country.

Again, in the matter of quality, Germany has a much lower standard than either England or France—viz., a yield of 290 litres per kilogram (4·64 cubic feet per pound) with 5 per cent. of dust; whereas in England the standard is a minimum of 4·8 cubic feet, and the carbide usually contains less than 2½ per cent. of dust.

As regards acetylene plants, British generators are superior to those made in Germany, both in respect to sound workmanship and design; and this is clearly enough shown by the fact that accidents have been far and away more numerous in the latter country, in spite of the infinitely more stringent regulations existing there.

I am in pretty close touch with German firms; but I do not believe there is one that can truthfully say that it has sold over 3000 plants, like one English firm I could name. I can also give plenty of instances where British plants, put in at the same time and in the same district as German ones, have far outlasted the latter and given greater satisfaction in every respect. I know, too, of more than one case where a German apparatus has been taken out and replaced by an English one.

Great stress is laid by Dr. Rose upon the question of village lighting by acetylene. Although it is a fact that more villages in Germany are using acetylene than in England, the equipment in England is no way behind that in Germany. There are now eight villages in the United Kingdom using acetylene, as compared with about twenty-four in Germany; but negotiations are in progress for equipping a considerable additional number, and everything promises that within a year or two we shall have many more village plants in the United Kingdom than Germany.

While thus asserting that the acetylene industry in Great Britain is no way behind that of any other country, it is an undoubted fact that nearly twice as much acetylene is used in Germany for general lighting as here. This is, however, not the fault of the British acetylinists. It is their misfortune. No one who has lived and travelled much on the Continent, can have helped being struck by the great number of large villages and small towns unprovided with gas or electric light. Towns of 12,000 inhabitants, like Tata-Tovaros (Hungary), which was unprovided with a central plant until acetylene was installed, are unheard of in this country.

Again, a vast number of large country houses in this country were equipped with their own electric light, or coal gas, or gasoline plant when acetylene was first introduced. On the Continent the private houses equipped in this manner are few and far between.

The price of coal gas and petroleum is also, as a rule, 40 to 50 per cent. lower in England than in Germany, and is of better quality.

Lastly, the trade in England has had to suffer from the exorbitant rates charged by English railways. While £16 per ton was being charged at the works in Scotland for carbide, friends of mine were paying over £6 for carriage to the South of England for one-ton lots. As showing the advantage Continental users have, I may mention that, whereas I pay only £2 (40·25 frs.) per ton for carriage from our works near Geneva to Treport (612 miles), I have to pay £2 2s. 2d. for the carriage from our Woolwich store to Bath (about 130 miles). Now, however, we have carbide stores all round the British coast; and this evil is righting itself.

It thus speaks volumes for the enterprise and ability of British acetylinists that, in spite of all these disadvantages, they have at least held their own as compared with Germans.

In conclusion, I wish, on behalf of a great number of members of the acetylene industry in the United Kingdom, to express our best thanks to Dr. Rose for his paper. Although, from the nature of things, he is much better acquainted with the German side of the question than the English, he has without doubt done the acetylene industry here an exceedingly great service by calling general attention to the progress this beautiful light is making.

CHAS. BINGHAM.

11, *Queen Victoria Street, E.C., Jan.* 28, 1901.

The Future of the Gas Profession.

SIR,—I should be glad if you would allow me to express my thanks to the writer of the articles anent the above, which recently appeared in the "JOURNAL." Now that we are entering upon a new century, many, no doubt, will agree with me that the matter should not be allowed to drop, but that an effort should be made in some direction whereby this correspondence may bear fruit. There is no trade or profession—call it which you please—that is more in need of a union, or concerted action, than ours; and if the governing bodies of our two Institutions could only join forces, and form a useful society, whereby the interests of the members could be better safeguarded in respect of adequate salaries, and proper treatment for those already in responsible positions and those learning the business, together with the provision of something for those who are by age or other cause obliged to give up active employment, considerably more benefit would arise.

At present, to many the paying of the annual fee to the Gas Institute yields nothing, as, by stress of duties or distance from place of meeting, they are unable to attend; whereas if it had more of a Trade Union about it (save the name), not only would boards of directors and gas committees be better informed as to the gas engineering profession, but the general public also. Many proprietors of gas-works are not aware that even the Gas Institute exists, and if their manager were to ask permission to attend the meetings, they would be considerably surprised. These proprietors require to have it brought to their notice that they can nowadays obtain a better-class person to manage, and rebuild if required, their dilapidated structures in many cases, and that the day of the "working manager" is past. Too much emphasis has for many years been laid on the latter term among a certain class of gas proprietors; and notwithstanding that their plant and everything connected with it has been doubled, they still think the title good enough, when they need a fresh pilot for the ship, though all the secretarial and clerical work may be included in the duties, and he may also be required to be capable of tactful and diplomatic dealing with consumers. An answer often given to inquiries made when a new manager is wanted is: "Oh, we want to keep out the gentleman element."

It is not so long since gas-works, and everything in connection therewith, were most dreadful to contemplate by the outside public, and very little respect was paid to the manager, whether "working" or otherwise, considering the house he had to live in. Compare the Continental picture. The manager of a gas-works, however small, is generally recognized as the only man with a full head of brains in the whole community; and he is therefore appreciated in consequence. No doubt some will remark that the fault rested a good deal with the men themselves. This may have been so in some cases; but now is the time to make it known that a better class of candidate is to be had, as in every other trade. There will then be a small beginning towards a levelling-up process.

We want the strong central authority mentioned in one of the recent communications to the "JOURNAL," with the District Associations as "Lodges," so to speak. Compare the Institute of Secretaries' method of proceeding with ours. That is more the thing we want. There must be less luck and influence, but more merit, in connection with appointments.

ONE OF THE PRESENT.

Feb. 2, 1901.

Gas and Water Supply in the Transvaal.—The Commission appointed to inquire into the concessions granted by the late Government of the Transvaal met last Wednesday, at their offices in Victoria Street, S.W. The Hon. A. Lyttelton, K.C., M.P., presided; and the other Commissioners (Mr. A. M. Ashmore, C.M.G., and Mr. R. K. Loveday), with Mr. B. Holland, the Secretary, were also present. Among other concessions considered was that of the Heidelberg and Krugersdorp gas supply. Mr. Whitley claimed the concession granted to him to have the exclusive right to supply gas to the places named for two years from July, 1898; and he asked that it should be confirmed. With regard to the Wonderfontein water concession, Mr. George Goch claimed to be its owner. It had originally been granted to the holders of farms at Wonderfontein, and gave the right to construct water-works for the supply of Johannesburg. In 1899, at the request of the Government, he procured new plans for an increased supply of water, and at the same time obtained an extension of time for the completion of the works. These plans had never been formally approved, so that he was unable to begin the construction of the works. Including the rent he had paid, he had expended about £20,000. Mr. Walter Hunter, M.Inst.C.E., said the plans were good, and the scheme would provide an abundant supply of water. Mr. J. W. Greig urged that the concession they held was one which the Government was perfectly qualified to give, and that they had complied with all the conditions of their concession.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Wednesday, Jan. 30.

(*Before Justices* WILLS *and* PHILLIMORE.)

Carroll v. The Gaslight and Coke Company.

This was an appeal from the Clerkenwell County Court, in which the plaintiff had obtained a verdict and judgment for £25, as damages for personal injury, under the Employers' Liability Act.

Mr. LOEHNIS appeared for the appellants; Mr. SCARLETT represented the plaintiff.

On the 25th of July last, Carroll was employed with another man, named Williams, in working a crane by means of a windlass, hauling a barge on the Regent's Canal, into the proper position to discharge coal at the wharf at the St. Pancras station of the Company. They had been using a "jenny" block, in which the chain jammed, and the foreman, Batley, fetched a snatch-block to put in its place. While changing the blocks, they had to slacken the chain; and in doing this the winch-handle swung round, and hit the plaintiff on the head, causing the injury. The Jury found that the machinery was in good order, but they gave a verdict for the plaintiff on the ground of negligence on the part of the foreman.

Mr. LOEHNIS urged that there was no evidence of negligence, and that the learned Judge ought not to have left that question to the Jury at all.

Mr. SCARLETT submitted that the question was rightly left, and that the verdict was supported by the evidence.

Justice WILLS said he was of opinion that there was no evidence of negligence to go to the Jury; and therefore the appeal must be allowed, with costs.

Justice PHILLIMORE concurred.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Thursday, Jan. 31.

(*Before Justices* WILLS *and* PHILLIMORE.)

East London Water Company v. Overseers of St. Mary, Stratford.

This was an appeal by the Company on a case stated by two Justices for their decision, on an application by the Overseers, under section 72 of the Valuation of the Metropolis Act, 1869, to insert the name of the appellants in the rate-book as liable to be rated in respect of certain land in the parish of St. Mary's, alleged to be in their occupation.

Mr. R. CUNNINGHAM GLEN (Mr. CRIPPS with him) argued the case for the appellants, in the unavoidable absence of his leader. Mr. ALEXANDER GLEN represented the respondents.

It appeared from the case that at the time the rate was made the appellants were the owners of certain land on which there was a disused reservoir, which they were desirous of filling up, so as to render it available for building; and for this purpose they authorized Messrs. S. Pearson and Sons, railway contractors, to deposit upon it spoil which they obtained in the construction of the Great Northern and City Railway. But at the time the rate was made, no arrangement had been come to as to terms of payment. On behalf of the respondents, it was contended that the appellants were in rateable occupation of the land in question, and that the Justices had jurisdiction to order their names to be entered on the list. For the appellants, it was urged that they were not in occupation, and that the Justices had no jurisdiction to make the order. These were the questions submitted to the Court.

At the conclusion of the arguments,

Justice WILLS, in giving judgment, said the appeal must succeed. He did not see any evidence that the appellants were in occupation of the land in the sense applicable in questions of rating, though they were, no doubt, in possession of it as owners. The only acts which could indicate occupation, apart from ownership, were those done by Messrs. Pearson; and this seemed sufficient to decide the case.

Justice PHILLIMORE concurred; and the appeal was allowed, with costs in this Court and below.

Mr. A. GLEN asked leave to appeal, as the question was important; and it was granted.

DENBIGH COUNTY COURT.—Tuesday, Jan. 29.

(*Before His Honour Sir* HORATIO LLOYD, *Judge.*)

Damage to Gas and Water Pipes by the Use of Steam-Rollers.

To-day his Honour had again before him the case of the *Denbigh Gas and Water Companies v. Corporation of Denbigh.** As will probably be remembered, the Companies some weeks ago sought to recover damages against the Corporation in respect of injuries caused to their mains by the defendants' steam-roller, and they also asked for an injunction against the further use of the roller. The Judge allowed the claim in respect of the damages to pipes which were at a lower depth than 18 inches, and also granted the injunction. A few days after delivering his judgment, however, he wrote to the Registrar of the Court withdrawing the portion dealing with the injunction; stating that, after reading a report of the case, he found that the plaintiffs had undoubtedly dropped the application for an injunction, on the Corporation agreeing to pay damages—a fact which he had overlooked.

Mr. E. ROBERTS applied that the judgment as originally delivered should be entered for an injunction, or, in the alternative, that a new trial should be granted on that ground only. He said he did not know whether or not the report of the proceedings upon which his Honour relied in altering his judgment, was accurate, but he begged to state now that there was no unconditional abandonment of the application for an injunction on the part of the plaintiffs. What was meant was that if the defendants agreed to pay all the claim, and make good all damage, the plaintiffs would not press for the injunction. As only part of the claim was allowed, he now applied that the injunction should be granted, or a new trial should follow in order to argue the question.

Mr. R. BANKES, on behalf of the Corporation, opposed the application, and argued that Mr. Roberts and also Mr. Storr, the Consulting Engineer to the Companies, gave the Court to understand distinctly that the application for the injunction would be dropped. He therefore did not fight the case on that point, but merely dealt with the question of damages. The defendants did not admit the claim as it stood, owing to some of the pipes being too near the surface, and also improperly laid.

His HONOUR said that when he gave judgment in favour of the injunction, it was owing to forgetfulness of the understanding; but when the matter was brought to his notice in the report, it came back to his mind most vividly. The understanding undoubtedly was that the question of injunction had absolutely gone, and the only point left for him to decide was the extent of the liability. The matter would stand as it was at present; and there was no reason why he should grant the injunction. If, however, the Corporation in future ran their steam-roller over the streets where pipes were laid to a depth of 18 inches and upwards, and an injury resulted, they, of course, would do so at their own risk. The parties knew his views as to the depth at which the pipes should be laid, and could therefore easily deal with the matter themselves.

Mr. BANKES: Then I apply that the application be dismissed, with costs.

His HONOUR: I refuse the application, with costs; and I certify also for Counsel's fee.

* See "JOURNAL," Vol. LXXVI., pp. 1407, 1464

BRADFORD CITY POLICE COURT.—Wednesday, Jan. 30.

(*Before Mr.* C. SKIDMORE, *Stipendiary.*)

The Charge for Water for Fire Extinction.

This was a test case in regard to the payment of the charges for water employed for the extinction of fire. It arose out of the serious fire which occurred on Dec. 23, 1899, on the premises of Messrs. Rouse and Co., spinners and manufacturers, Canal Road, Bradford, which were peculiarly inaccessible. In addition, the premises of Messrs. E. B. Whitley and Co. and the Corporation gas-works were much damaged by the conflagration, which was noticed in our columns at the time. The Corporation sought to recover £79 4s. 10d. from Messrs. Rouse, who resisted the claim on the ground that, though the water was registered by their meter, they were not liable for it, as it was not used by them but by the Fire Brigade in the performance of their duty. They tendered £33 10s., which they considered a fair average for the quarter, in settlement of the claim. The case was argued at a previous sitting before the Stipendiary and a full Bench of Magistrates; and to-day the former delivered his considered judgment.

Mr. H. HANKINSON (Deputy Town Clerk) appeared for the Corporation; Mr. A. NEILL represented the defendants.

His WORSHIP pointed out that of the £79 4s. 10d. claimed, £33 10s. was admitted to be due; but the Corporation had refused to accept the money in discharge of their claim. As to the balance of £45 14s. 10d., it was a divisible sum, made up partly of so much water which had passed through the defendants' meter, and which had been used to extinguish the fire, and partly of water which escaped through a pipe broken by a fallen wall and other *débris* caused during the fire. For the Corporation, Mr. Hankinson submitted that this was a special contract, and that all water which passed through the meter must be paid for by the defendants, whether it was actually used by them or not. In this contention, he relied upon sections 41 and 42 of the Bradford Water-Works Act, 1847. Mr. Skidmore said he agreed that the defendants could have requested the Corporation to fix and maintain a fire-plug to be used only in the event of fire; but this raised a further question. Did that preclude the defendants from also using all other hydrants, both in the streets and on their premises, for a like purpose? Mr. Neill, for the defendants, argued, first, that the Corporation had a monopoly of water rights which must be used for the public good—as in case of fire—without compensation; secondly, that the water was not consumed by the defendants, but by the servants of the Corporation, who fixed a hose on the defendants' hydrant to extinguish the fire; thirdly, that the leakage was the result of the fire, a wall having fallen on the pipe and broken it; and fourthly, if this portion of the claim was insisted upon, Mr. Neill demanded £18 for water taken from the defendants' dam to extinguish the fire. It was proved at the hearing that the hose was attached by the Corporation's servants to the hydrant, which was in the defendants' yard, and that all the available street hydrants were used in addition in extinguishing the fire at the mill, and also on Mr. Whitley's premises adjoining. It was also proved by Mr. Watson, the Water-Works Engineer, that the greater part of the water could not have been used in extinguishing the fire, having regard to the time the brigade were at work and the size of the nozzle of the hose; that the excess was leakage of the pipe, however caused. Mr. Skidmore said he found that the defendants' hydrant was so used by Corporation servants, along with public hydrants, for extinguishing the fire; that the water was not consumed in the defendants' business; and that it was not equitable, just, or lawful that they should pay for water consumed by the Corporation in extinguishing an accidental fire which might have become a danger to the public. The amount of the balance in dispute was £45 14s. 10d. To strike a proportion, he should say that £20 worth was consumed by the Corporation in putting out the fire, and that the value of the water wasted by leakage was £25 14s. 10d. That, in the absence of authority, he held to be due to the fire; which caused the wall and *débris* to fall and break the pipe. The leakage claimed was an afterthought, as was proved by the correspondence. He, therefore, made

an order for £33 10s., the amount tendered, and found to be due for average consumption. He had no power to deal with the counter-claim, and must leave the defendants to their remedy elsewhere.

Mr. HANKINSON said he would report the decision to his Committee; and he asked whether the Stipendiary would state a case if they decided to carry the claim further.

Mr. SKIDMORE expressed his willingness to do so if desired within the prescribed period of seven days.

The Claim Against Messrs. Willey and Co.

At the Marylebone County Court last Friday, before his Honour Judge Stonor and a Jury, Matthew Davies, a riveter, of No. 7, Charlotte Terrace, Notting Hill, sought to recover damages, under the Employers' Liability Act, from Messrs. Willey and Co., of Exeter and Adam Street, Adelphi, W.C., in respect of personal injuries sustained by him owing, it was said, to negligence from which the defendants were responsible. Mr. Vincent D. Knowles appeared for the plaintiff; Mr. E. F. Leaver defended. The case had been before the Court on a previous occasion (*ante*, p. 218), when the Jury returned a verdict which his Honour deemed unsatisfactory, and at once consented to a new trial. The facts of the case have been already set forth. Mr. Knowles now submitted, first, that there was a defect in the plant owing to a plank being too long; secondly, that there was negligence on the part of the foreman in ordering the plaintiff to use the plank, and also in taking a man away from the rope holding it. Abraham Buckner, a man working on the job, stated that he heard the man Prout called away from the rope; but while he thought it was the foreman who did this, he could not be quite sure as to the voice. Nathaniel Robert Baker, who was also on the spot, said he saw Prout walk away, but did not hear anyone call him. For the defence, Henry Giddings, the foreman, emphatically denied calling Prout away from the rope. It was a fact, however, that he called out to Prout to assist with the bolting. Mr. Harry Grove, gas engineer in the employ of the defendants, stated that proper material was sent to the job, and that if anything more had been required the men might have had it. Mr. E. R. Johnson, clerk of the works, said he was near the foreman at about the time of the accident, but did not hear him call the man Prout away from the rope. Arthur Sharp stated that while they were pulling the rope Davies (the plaintiff) commenced swearing, and Prout told Davies to come down and pull it himself—at the same time walking away. John Bagley said he was working within a few yards of the foreman at the time of the accident, and did not hear him call Prout away. James Prout said that, while he was assisting in pulling the rope, Davies started swearing, and witness walked away, telling the plaintiff to pull the rope himself. His Honour put the following questions to the Jury: (1) Did Giddings call Prout away? (2) Was Giddings guilty of negligence in calling Prout away? (3) Did Prout let go the rope in consequence of Giddings calling him away? The Jury found: (1) That Giddings did call Prout away; but (2) that Giddings was not guilty of negligence in doing so, because he did not know that Prout was holding the rope. (3) That Prout did let go the rope in consequence of Giddings calling him away. This was a verdict for the defendants. His Honour gave judgment accordingly, allowing costs; but he consented to the plaintiff moving in regard to claiming under the Workmen's Compensation Act.

Embezzlement by a Gas Collector.

At the Swindon Police Court last Thursday, John Edwardes Mills, clerk and collector in the service of the Swindon Gas Company, was sentenced to six weeks' imprisonment for embezzling various sums of money, the property of his employers. It was the prisoner's duty to collect the quarterly gas bills, account for the money to the Manager, enter the amounts in the collector's cash-book, and credit the consumer in the customers' journal. For the past eighteen months he admitted that he had put sums amounting in all to £200 into his own pocket Where a demand-note showed an item or items of arrears which the prisoner had already embezzled, it was his practice to destroy this note and prepare and present to the customer another showing no arrears. When the irregularities became known, the prisoner left Swindon; but, at the request of his father, who is a prominent and much-respected resident, and a former member of the governing body of the town, he returned, and, throwing himself upon the mercy of the Directors of the Company, gave them every assistance in the investigations which took place. His father has expressed his readiness to return the amount embezzled.

Artesian Boring in Central Australia.—The great value of artesian borings in Central Australia has just been proved by the successful result of operations at Anacoora, about 50 miles east of Charlotte Waters. After boring to a depth of 1250 feet, a daily supply of 700,000 gallons of water has been obtained, and a dry district has been transformed into an oasis. There is now a lake about half a mile long and a quarter of a mile wide at Anacoora. In consequence of the great success of this bore, the Government are inviting tenders for the sinking of another about 30 miles to the north-east, where the prospects are equally favourable, except that it is likely that the bore will be a little deeper.

Manchester and the Salford Water Supply.—As there is no prospect of an arrangement satisfactory to Salford being arrived at between the Corporation and the Manchester City Council regarding the water supply, the former are pressing on with the formalities connected with the promotion of their Bill. It will be remembered that its object is to amend the Salford Improvement Act, 1862, so as to place an obligation on Manchester to supply to Salford, at a price fixed by an independent authority, such quantity of water in bulk as may be required for all purposes in addition to the 2 million gallons specified in the Acts contained in the schedule to the 1862 Act. In Salford, it is still hoped that terms will be arrived at, so as to prevent an encounter in the Parliamentary Committee rooms. The Corporation last Wednesday confirmed the resolution as to the propriety of proceeding with the Bill.

MISCELLANEOUS NEWS.

PARIS GAS QUESTION.

Stormy but Inconclusive Debate in the Municipal Council.

In the "JOURNAL" for the 1st ult., we dealt briefly with the progress of the above question up to the close of the past year. It may be remembered that the negotiations between the First Committee of the Municipality and the Gas Company's representatives had come to a deadlock when a proposal was submitted by MM. Deville, Caron, and Rendu to re-open them, with the view of the works being taken over by the City as from the beginning of the present year, and "farmed" by the existing Company, or another, on certain specified terms and conditions. Although the Chairman of the Committee (M. Alpy) had presented a report which appeared to close the door for further negotiations, he looked favourably upon the new scheme, and, by what was promptly characterized as a *volte-face* on his part, threw out the suggestion that the Council should stay their hands until they had heard something more from the Company. The proposition of M. Deville and his colleagues was considered by the Committee at a meeting on the 8th inst., when the authors were heard in explanation of its various points; but no decision was come to. Subsequently the Prefect of the Seine was asked to convene a special meeting of the Council to dispose once for all of this troublesome and apparently interminable question. It was held on the 25th and 26th ult.; but, unfortunately, no definite solution was reached. The subject was very warmly discussed, and a good deal of personal feeling was displayed on both sides; the proceedings becoming at times quite tumultuous.

The debate was opened in the afternoon of the first-named day by M. Caron, who defended the proposal which he and his two friends had introduced, and declared that if the City would agree to treat with the Company on the basis there laid down, the gas consumers would realize a profit of 125,000,000 frs. This assertion was met by protests from the Left. M. Labusquière asked why the investigation of the Company's accounts which had been sanctioned by the Council had not been carried out by the First Committee. He said the Council were asked to pledge the City once more, and therefore they should know what was the actual situation. Documents which were indispensable, if the representatives were to act in the best interests of their constituents, had not been forthcoming. M. Alpy, the Chairman of the Committee, promised that figures should be furnished later on. A considerable number of the Council protested at this method of procedure, as compromising the interests of the citizens; and there was a general disturbance. When something like order had been restored, M. Caron concluded his speech. He was followed by M. Gelez, who criticized the proposal before the Council, and argued in favour of municipalizing the gas-works. The next speaker was M. Sauton, who some time ago made himself conspicuous in connection with the proceedings successfully instituted against the Company by the Municipality with regard to the redemption of their capital, to which reference was made in the "JOURNAL" for June 12, 1900. His speech, which was attentively listened to, and frequently applauded, closed with a recommendation to the Council to refuse to grant any further prolongation of the present monopoly in favour of the Company, and await the expiration of their Treaty. At the same time he thought the City should itself bear the expense of an immediate reduction in the price of gas, debiting it to the deferred profits which would come into the exchequer on Dec. 31, 1905. This would, he said, be a logical course to take, inasmuch as the City had for many years been calling for some concession in respect of the price, and it would also be equitable to the consumers. M. Sauton's address made a deep impression upon his auditory. Other councillors having spoken, M. Foursin proposed that the question should be submitted to the electors in the form of a *referendum*, as is done in Switzerland; and that 25,000 frs. should be set aside for the purpose. But on it being pointed out that this would not be a legal proceeding in France, he withdrew his motion; and the debate was adjourned till the next day.

The discussion was resumed at ten o'clock on the following morning; nearly all the members of the Council being present. Business began by the withdrawal by M. Sauton of the proposition he made on the previous day, and the substitution of another in which he suggested that the Prefect of the Seine should be asked to arrange with the Gas Company for the taking over of their property by the City on the termination of the concession, and the reduction of the price of gas to 20 c. per cubic metre from Jan. 1, 1902, on the following conditions: The 97,000,000 frs. of bond debt standing on Jan. 1, 1901, to remain till Dec. 31, 1905, when it would be liquidated by the City, who would at the same date pay the Company a sum of 101,000,000 frs., representing the amount taken out of the proceeds of the concern; the Company on their part to give up possession of the whole of the then existing assets. M. Patenne next proceeded to criticize the general conduct of the Company, and entreated his colleagues not to renew the present monopoly on any pretext whatever. M. Caplain used still stronger language. He charged the Company with bad faith and systematic deception; and he declared that neither the Parisians in general nor the electors in particular would forgive the Municipal Council for re-opening negotiations with them. They should be cut adrift as soon as possible. This caustic orator was followed by M. Bussat, who submitted a remarkable proposition to the effect that the Administration should investigate every practicable means of reducing the price of gas to 20 c. from Jan. 1, 1902, and on the acquisition of the works should lease them to the Company's officials. The consideration of these matters occupied the Council till nearly midday, when a violent tumult occurred, in the midst of which the proceedings were suspended.

At the sitting in the afternoon, the first speaker was M. Labusquière, who enlarged upon a proposal he had submitted on behalf of a group of Socialists, calling for the immediate rupture of all relations with the Gas Company, and the municipalization of the gas undertaking, if this were legally possible. At this point, the Prefect of the Seine (M. de Selves) interposed, and read a letter from M. Waldeck-Rousseau, the President of the Ministerial Council, in which he stated that, speaking

under reserve, as he had not carefully examined the resolutions come to by the Council, he was of opinion that the law could not be invoked to prevent the City from supplying gas. The reading of the letter was followed by protests from the Right (the Nationalists) and applause from the Left. On order being restored, M. Labusquière concluded his speech by declaring that neither he nor his friends would support the Deville-Caron-Rendu scheme, and calling upon the Council to support his proposition. At this juncture the President of the Council (M. Grébauval) offered a few remarks. He pointed out that they had before them three distinct questions. First, there was the reduction of the price of gas; secondly, the conditions under which the existing Company were to be bought out; and, thirdly, the measures to be taken in regard to the future. Having dealt *seriatim* with these matters, and examined critically the projects brought forward, he asked the Council to declare, purely and simply, by their vote, that the City should take possession of all her rights in the gas undertaking in 1906; and then, if possible, carry on the lighting service herself, or allow it to be farmed. By so doing, her freedom of choice would be preserved. The Prefect of the Seine followed. He said he should be neglecting a very pressing duty if he failed to give the Council his views on the important question before them. He then proceeded to deal with the various difficulties which had arisen since the first Treaties with the Gas Company were concluded, and passed on to the proposal submitted by M. Deville and his colleagues. He confessed that he had only been able to examine its principal features; but this fact was clear—that by leaving things as they are the Municipality would have to put upon the budget, as from the beginning of 1906, a sum of 5,000,000 frs. annually, whereas if the proposal he had been considering were adopted, they would have to provide 12,000,000 frs. And with what object? Simply to relieve the consumers for a space of four years. He therefore asked himself whether the benefit to be realized by them during so short a period as this was sufficiently great to justify the sacrifices the City would have to make and the obligation to the Company under which the taxpayers would be placed for fifty years. M. de Selves next passed on to criticize the conditions proposed by the "farming" company, and was giving his views as to the interpretation of one of the clauses, when he was met by a direct denial from the Right, and considerable disturbance ensued. In the midst of the tumult, M. Ambroise Rendu produced a letter which had been brought to him; and M. Alpy exclaimed: "Here is the contradiction." These words only had the effect of adding to the excitement; and when certain councillors discovered that one of the public benches was occupied by representatives of the Gas Company and of the proposed "farming" company, there were cries of "Turn them out" and "Shame," accompanied by hostile demonstrations. Finding it impossible to restore order, the President had the benches cleared, and, it being seven o'clock, the sitting was once more suspended.

When the debate was resumed at nine o'clock, a calmer feeling prevailed, and the Prefect of the Seine was able to bring his remarks to a close without any fresh incident. He insisted that the proposal for a new Treaty could not be accepted as it stood. Its authors would probably reply that it could be amended. They might amend a Bill, but not a Treaty. The one proposed was not acceptable; and therefore the course to be taken by the Council was an extremely simple one—they must say plainly that they could not accept it, and show that they meant what they said by passing to the next business on the order of the day. The concluding words of the Prefect evoked loud applause from the Left. He was followed by Me Desplas. Basing his remarks upon the figures contained in the Company's accounts, he contended that if the Municipality took in hand the management of the gas supply in 1906, they would be able to produce gas at 11 c. per cubic metre; and, consequently, if they charged for it at the rate of 15 c. and 20 c. they would make considerable profit—twice as much, in fact, as they now received from the Company as their share. His advice, therefore, was to wait till the termination of the existing concession. If they adopted the Deville project, they might never expect to be forgiven by their constituents for such disregard of their real interests. The learned orator was vigorously applauded by a large number of the Council. M. Deville then replied to the various speakers, and endeavoured to show that the adoption of his project would not be attended by such dreadful consequences as had been supposed. He emphasized various points in the arguments of M. Caron, and dwelt upon the advantage which would accrue to the consumers by an immediate reduction in price. In the course of his reply, a little passage of arms occurred between himself, the Prefect of the Seine, and M. Alpy, as to the part each had played in the several recent negotiations with the Company.

After the excitement to which this incident gave rise had subsided, at something after one o'clock on the morning of the 27th ult., the Council proceeded to vote. There were altogether four proposals in opposition to that of M. Deville—the members responsible for them being respectively MM. Labusquière, Sauton, Bussat, and Dubuc. Priority was demanded for the project of the last-named gentleman, which, in substance, was to allow the existing Treaty to lapse by effluxion of time, under the existing conditions; the Municipality, from Jan. 1, 1906, to exploit the gas undertaking in the interests of the consumers, the taxpayers, and the officials and employees. The voting on this proposal was equal—38 on either side; and so it was declared lost. The proposition of MM. Deville, Caron, and Rendu was then put amid great excitement. On the votes being counted, the President said it was lost by 38 votes to 37. The announcement of the numbers was hailed by the Left with vigorous applause, and cries of "Vive la République!" In view of this result, the other propositions, which did not present any immediate solution of the question, were referred to the First Committee for consideration; and the protracted proceedings were brought to a close.

It may be remembered that arrangements were made for Mr. G. Hampton Barber, the new Secretary of the Birmingham Corporation Gas Department, to take up his new duties on the 1st inst. But in order that he may have the benefit of the advice and assistance of Mr. Edwin Smith in the initial stage, that gentleman has been requested by the Gas Committee to defer his retirement till the 31st prox.

DAMAGE TO GAS-MAINS BY ELECTROLYSIS.

We learn from the "Engineering News" that an important decision relating to the responsibility for damage to underground pipes by electrolysis has lately been given at Indianapolis. The action was brought by the Manufacturers' Natural Gas Company against the Indianapolis Street Railway Company, for compensation for injury caused by their currents to the gas-pipes. The decision is a preliminary one, in the Superior Court, overruling a demurrer in which the defendants sought to set aside the action; but inasmuch as this will be heard by the same Judge on the trial, and as the text of his decision covers some of the points at issue, it lays down principles which will very properly be acted upon later on. Our contemporary acknowledges its indebtedness to the Manager of the Gas Company (Mr. F. A. W. Davis) for the following abstract of the decision.

The method in use by the defendants in operating their cars results in serious injury to, and in some cases in the destruction of, the plaintiffs' pipes. By the use of an approved appliance, the defendants can, at reasonable expense, so operate their cars as to avoid such injury; but the plaintiffs cannot, by any known method, protect their pipes. The plaintiffs own their pipe-line laid in the street by legal authority; and such pipe-line is property within the meaning of the constitution and laws. The Street Railway Company seize on these pipes, and make use of them as conductors for their return current; and in so doing they greatly injure, and in some instances wholly destroy, them. This is done under a claim that the Company are performing a public service by authority of the law. Is it not taking private property for public use, for which just compensation must be made? I do not see that the fact that the Street Railway Company's tracks, poles, and wires may have been placed in the street before the plaintiffs' pipes were so placed can make any difference, unless it should be shown that when the plaintiffs placed them there they knew of the injuries to which they would be subjected. The city could not, and did not, grant a monopoly of the street either to the defendants or their predecessors, and when the tracks, poles, and wires were placed in the street, the Railway Company knew that gas and water pipes might be laid there at any time, and they acquired their rights to run an electric road subject to this fact, and all the consequences that might follow. The plaintiffs are not trespassers, but occupy the street lawfully; and while there their property is taken by the Street Railway Company as a consequence of their operations.

Justice Brown states that the substance of all the cases he has examined is that where a person is making lawful use of his own property, or of a public franchise, in such a manner as to occasion injury to another, the question of his liability will depend on the fact of whether he has made use of the means which, in the progress of science and improvement, have been shown to be the best. A street railway company are not, however, bound to adopt the latest invention, or to adopt any, before its utility and practicability have been demonstrated by use.

The case made out by the complaint in this cause seems to meet the requirement contained in Judge Brown's statement. According to the allegations in the complaint, the defendants have failed to adopt an approved appliance, which could be done at a reasonable expense, and when by so doing the injuries complained of could be avoided. I cannot see any difference in principle between a case in which liability attaches from failure to adopt the best-known device and one where there is a failure to adopt any device whatever, when there are devices by which the injury could be avoided, and the utility of which has passed the point of being a mere experiment.

These questions are new, and we are without precedent in decided cases for our guidance; but as these new questions arise, the administration of the law should keep step to the new situations arising in the march of scientific invention and improvement, not by inventing new legal principles, but by the expansion of old and well-recognized principles of law and equity so as to meet and cover the new situation. It would be a reproach to our system of jurisprudence and the administration thereof if a situation could arise in which large and material injury should be done to legal rights, and destruction caused to property, and the law be powerless to apply a remedy.

Take the situation in this city, The number and size of the cars propelled through our streets by electricity is ever rapidly on the increase. Suburban lines are coming into the city from every direction, with cars larger than ever before used on the streets. The currents of electricity which now are, or soon will be, discharged into the earth of the streets are very large; and if it be true, as claimed in some of the cases which I have examined, that these currents not only attack gas and water pipes, but the steel frames of tall buildings as well, and that such steel frames may be deteriorated and weakened so as to imperil such buildings, is there no remedy in the law to prevent it, or to compel the Street Railway Company to control its return current when it is conceded that it is reasonably in its power to do so?

Where a corporation is exercising a public franchise, and does so in such a manner as to cause actual material injury to legal rights and destruction of property, when, at reasonable expense, by the adoption of well-known and approved appliances, the injury could be avoided, and the person injured is powerless to prevent or guard against such injury, then I think it must be held to be negligence in the use of its franchise on the part of such corporation not to adopt such approved appliances. The destruction of the plaintiffs' pipes so as to permit gas to escape and cause destruction to life and property cannot be said to be mere annoyances, inconveniences, or incidental damages. It has been held in New York, in the case of *Siebrecht v. East River Gas Company*, that the Company are liable for damages sustained by the action of gas which escaped from their pipes from leaks caused by electrolysis. To be subjected to such a liability cannot be considered a mere incidental damage.

For the foregoing reasons, I think the complaint states a good cause of action; and the demurrer is therefore overruled.

Notice of motion has been given for the meeting of the Pudsey Town Council that an inquiry be addressed to the Gas Company respecting the price they are willing to accept for their undertaking.

GASLIGHT AND COKE COMPANY.

Half-Yearly Accounts.

The accounts accompanying the report of the Directors of the above-named Company for the half year ending Dec. 31, 1900 (*ante*, p. 285), consist of the usual statement, from which we extract the following particulars :—

The statement of capital (stock) on Dec. 31 stood as follows: Total paid up, £9,303,310; added on conversion, £12,176,490; unissued, £163,190—total amount authorized, £21,642,990. The statement of loan capital stood thus: Total paid up, £2,713,450; added on conversion, £1,479,975; unissued, £130,550—total amount authorized, £4,323,975. The total stock and loan capital authorized was therefore £25,966,965, of which £25,673,225 had been paid up or added on conversion or consolidation; leaving £293,740 unissued.

The capital account shows receipts (with premiums, £1,598,991) to the amount of £27,272,216. During the half year, £86,810 ordinary stock and £69,450 of 3 per cent. consolidated debenture stock were received; but the item of premium capital at the close was lower by £4059. The expenditure is shown in the following items :—

Expenditure to June 30, 1900			£12,893,545 15 10
Expenditure during the half year to Dec. 31, 1900—viz.,			
Buildings and machinery in extension of works	£44,700 18 11		
New and additional mains and service-pipes	24,238 0 11		
Do. do. meters	21,197 0 10		
Do. do. stoves	19,709 1 8		
	£103,845 2 4		
Cr by sale of surplus land	23,338 9 4		
		80,506 13 0	
Total expenditure			£12,974,052 8 10
Nominal amount added on conversion			13,656,465 0 0
Balance of capital account			641,698 12 9
			£27,272,216 1 7

The following is the revenue account :—

Receipts.

December, Half Year, 1899.		£ s. d.	£ s. d.
	Sale or gas—		
£1,505,405	Common gas, per meter, at 3s. 5d. and 2s. 8d. per 1000 cubic feet	1,616,292 2 4	
74,076	Public lighting and under contracts—Common gas	88,103 1 10	
£1,579,481			1,704,395 4 2
22,437	Rental of stoves	..	24,796 12 6
	Residual products—		
£321.182	Coke, less £41,080 2s. 7d. for labour, &c.	404,502 17 2	
9,008	Breeze, less £2188 8s. 5d. for ditto	14,362 12 0	
68,885	Tar and tar products	62,949 4 4	
82,353	Ammoniacal liquor and sulphate of ammonia	69,823 2 0	
			551,637 15 6
£481,428			
£4,635	Rents receivable		4,798 18 7
239	Transfer fees		204 15 0
£2,088,220			2,285,833 5 9

Expenditure.

December Half Year, 1899.		£ s. d.	£ s. d.
	Manufacture—		
£726,191	Coals, including oil, dues, carriage, unloading and trimming	1,006,312 19 8	
14,455	Salaries of engineers and other officers at works	15,230 9 10	
161,685	Wages, carbonizing £153,064 13s. 9d.		
17,348	,, sundries £17,483 1s. 8d.	170,547 15 5	
35,187	Purification, including £16,487 18s. 8d. for labour	38,555 10 1	
178,977	Repair and maintenance of works and plant, materials and labour, less received for old materials, £3,421 2s.	218,149 9 0	
			1,448,796 4 0
	Distribution—		
34,349	Salaries and wages of officers (including Rental Clerks)	35,654 7 2	
43,101	Repair and maintenance of mains and service-pipes	34,885 16 5	
22,039	Repair and renewals of meters	23,992 1 3	
30,526	Stove fixing, repairs, and renewals	30,944 15 7	
..	Gas fittings (automatic meter supplies)	27,821 3 9	
			153,298 4 2
16,045	Public lamps—Lighting and repairing	..	17,286 7 3
	Rents, rates, and taxes—		
6,154	Rents payable	6,132 13 5	
118,229	Rates and taxes	133,881 3 10	
			140,013 17 3
	Management—		
2,750	Directors' allowance	2,750 0 0	
253	Company's Auditors and Assistant	225 4 0	
10,946	Salaries of Secretary, Accountant, and Clerks	11,088 10 4	
20,425	Collectors' commission	21,070 3 1	
6,964	Stationery and printing	8,041 15 8	
3,487	General charges	3,900 7 0	
			47,076 0 1
634	Law charges	..	726 8 3
..	Charges *re* quinquennial re-valuations	..	2,000 0 0
5,432	Bad debts	..	5,064 7 1
500	Depreciation fund	..	500 0 0
12,932	Annuities	..	15,015 7 10
2,046	Workmen's compensation account	..	1,421 1 2
	Public officers—		
1,438	Gas Referees and Official Auditor	1,344 5 2	
1,242	Public testing-stations	1,640 0 1	
			2,984 5 3
£1,473,335			1,834,182 2 4
614,885	Balance carried to net revenue account		451,651 3 5
£2,088,220			2,285,833 5 9

The net revenue account stands as follows :—

December Half Year, 1899.		£ s. d.	£ s. d.
£506,888	Balance from last account	626,602 13 11	
367,330	Less dividend on the ordinary capital for the half year to June 30, 1900	329,847 13 0	
£139,558			296,755 0 11
614,885	Revenue account	..	451,651 3 5
£754,443			£748,406 4 4

December Half Year, 1899.		£ s. d.	£ s. d.
£66,410	Interest on debenture stock and bonds, accrued to Dec. 31, 1900	..	66,504 17 0
75,999	Dividend on the preference stocks	75,999 4 0	
45,500	Dividend on the 3½ per cent. maximum stock	45,500 0 0	
			121,499 4 0
5,870	Interest on temporary loans and sundry funds	..	8,648 12 10
560,664	Balance applicable to dividend on the ordinary stock	..	551,753 10 6
£754,443			£748,406 4 4

The balance available for division is £551,753 10s. 6d.; and the statement showing how the Directors propose to appropriate it is as follows :—

Dec., 1899.			
£139,558	..	Net balance brought from last account	£296,755 0 11
421,106	..	Net revenue for the half year	254,998 9 7
£560,664			£551,753 10 6
(£4 18s. per cent.)		A dividend on the ordinary stock—	
£367,330	..	£4 8s. per cent. per annum on £15,079,885	330,183 0 1
£193,334	..	Balance carried to next account	£221,570 10 5

The three statements relating to the reserve, insurance, and depreciation funds show that the balances on Dec. 31 were as follows: Reserve fund, £52,597; insurance fund, £85,674; and depreciation fund, £56,532. The insurance fund had to bear in the past half year a sum of £63 1s. 10d., the value of plant destroyed by fires in the Company's district.

The statements furnishing particulars as to working are as follows :—

Statement of Coal Used, &c.

Description of Coal.	In Store June 30, 1900.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1900.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	121,085	1,089,112	905,140	1,972	303,085
Cannel	8,931	11,458	*7,087	..	13,302
Total	130,016	1,100,570	912,227	1,972	316,387

* In addition to this quantity of cannel, 5,036,884 gallons of oil and spirit were used during the half year.

Statement of Residual Products.

Description.	In Store June 30, 1900.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1900.
Coke—tons	26,228	566,655	128,648	405,164	59,071
Breeze—tons	2,105	67,505	13,172	52,522	3,916
Tar—gallons	916,627	9,075,871	8,787,962	20,540	1,183,996
Ammoniacal liquor—butts	19,051	262,164	259,915	..	21,300

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts. (Estimated.)	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
* 10,603,384	536,816	9,568,645	10,257,459	51,788
† 11,424,876	549,952	10,214,092	10,920,463	52,522

* Including 1,578,712,000 cubic feet of "oil gas." † December half year, 1899.

The last statement is the general balance-sheet. It shows that the value of the stores on hand on Dec. 31 was as follows: Coals, £314,609; oil and petroleum spirit, £129,335; coke, £50,742; tar and ammoniacal liquor and products, £135,127; sundries, £258,160—total, £887,973. The figures for the corresponding period of 1899 were: Coals, £114,013; oil and spirit, £25,246; coke, £24,329; tar, &c., £112,418; sundries, £229,350—total, £505,356. The item "automatic meter supplies (balance of fittings account)" amounts to £224,657, as compared with £289,605 at the close of the six months ending Dec. 31, 1899.

We learn from the "Financial News" that the shareholders of the German Incandescent Light Company have approved of the agreement with the Austrian Welsbach Incandescent and Electricity Company relating to the working in Germany and Holland of the newly-patented electric incandescent lamp. It appears that it will be several months before the Austrian Company can put the invention on the market, owing to insufficient supplies of osmium, from which the incandescent thread is manufactured, having been secured.

BRENTFORD GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present at the half-yearly meeting next Friday, they state that, owing to the high temperatures ruling during the winter portion of the past six months, together with the exceptionally bright weather, the increase in the sale of gas did not favourably compare with the corresponding period of 1899; being only 1·6 instead of 8 per cent. There was, however, a very marked increase in new consumers, both ordinary and automatic; being 1180 and 1678 respectively. With a return of normal winter conditions, the Directors anticipate a largely augmented output of gas will be required. The accounts accompanying the report show that the sale of gas produced a revenue of £128,921, compared with £126,870 for the latter half of 1899; meter and stove rents brought in £11,605, against £10,372; residual products, £35,236, against £31,883; and the total revenue was £175,807, against £169,163. The expenditure on the manufacture of gas was £97,514, compared with £84,375; coal and oil costing £75,237, against £60,271. The expenses of distribution were £20,548, compared with £17,159; the repairs of mains and service-pipes having cost £7807 instead of £5742. The total expenditure was £135,307, against £117,954; and the balance carried to the profit and loss account £40,500, against £51,209. The amount available for distribution is £79,623; and the Directors recommend the dividends mentioned in the "JOURNAL" last week—viz., at the rates of 5, 12, and 9 per cent. per annum on the three classes of stock. The statements relating to manufacture show that, under the supervision of Mr. James Husband, 64,654 tons of Newcastle coal, and "Solar" oil equal to 21,545 tons, were used during the six months in the production of 939,926,000 cubic feet of gas, of which 885,234,000 cubic feet were accounted for. The estimated quantities of residuals produced were: Coke, 43,121 tons; breeze, 5375 tons; tar, 684,801 gallons; and ammoniacal liquor, 18,367 butts.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report and Accounts.

The following is the report of the Directors of this Company for the six months ending Dec. 31, 1900, which, with the accounts, will be presented at the half-yearly general meeting on the 13th inst.:—

The excessive price of coal—the highest since 1873—has been the predominant fact of the half year. Over the corresponding period of the previous year, there has been an increase in the gas sold of 1·8 per cent.; but coal has cost 60 per cent. more, or a total addition of £208,832. All other materials and apparatus used in manufacture or repairs have also cost more, with the result that the expenditure of the half year amounts to £890,287, against £651,915 a year ago. The latter included £11,000 credited under the profit-sharing system, which does not appear in the present accounts. Thus the officers and workmen, in common with the shareholders and consumers, have to bear a share of the loss caused by the high price of coal.

This additional expenditure of about a quarter of a million has been partly met by an addition of £75,098 to the receipts for coke, and a rather better income from tar and ammonia; but, notwithstanding these gains, there would have been a deficiency greater than the whole half-year's dividend had the price of gas not been raised. The increase in the price of gas was therefore a necessity, and, by the automatic action of the sliding-scale, the dividend payable is reduced by £19,796 in the half year, which is the measure of the loss to the shareholders.

The result of the half-year's working with the dividend reduced to 5 per cent., is a deficiency of £9089. Add to this the losses of £11,000 mentioned in paragraph 1, and £19,796 in paragraph 2, and there is a total of nearly £40,000 as the Company's share for the half year of the burden resulting from the excessive cost of coal. The Directors recommend a dividend at the rate of 5 per cent. per annum.

The very small increase of 1·8 per cent. in the consumption of gas, following 8¼ per cent. a year ago, and over 12 per cent. in the half year to June last, may be attributed to two causes—the increase of price which at once checked consumption, and the very mild December. Otherwise the business of the Company is in a very prosperous condition; and the plant is in good order and ample to meet all demands. The Directors have every reason to believe that with cheaper coal when their present contracts expire, and a consequent reduction in the price of gas, which they intend to make next June, the increases which have been usual will recur.

The Directors think it may be interesting to the shareholders to be informed that they have induced the Local Authorities to adopt incandescent gas lighting. This system is now the rule almost throughout the Company's district, which extends nearly to the whole of South London. In the main thoroughfares the Company have introduced a new lamp-post* and lantern, which are recognized as a considerable improvement upon the old patterns.

It is due to the officers and workmen to state that they have accepted in the right spirit and without a word of complaint the temporary loss of their profit-sharing bonus; and the spirit of goodwill that has prevailed ever since the strike in 1889 is fully maintained. Nearly all are shareholders; their aggregate holding being worth £103,394, in addition to £30,638 on deposit with the Company. This creates a unity of interest that makes everything run smoothly. So far from any feeling of anxiety on the part of the management in regard to the workmen, the Board feel confident that they, equally with the officers, can be relied upon to do good and faithful service under all circumstances.

The Company are promoting a Bill in Parliament for the purpose of purchasing by agreement the southern works and district of the Gaslight Company, in accordance with one of the recommendations of Sir James Rankin's Committee on the London Gas Supply in 1899. The Bill also takes power to raise some additional capital. It will be submitted to the proprietors at an extraordinary general meeting to be held after the ordinary meeting.

* The lamp-post referred to was described and illustrated in the "JOURNAL" for April 17, 1900, p. 1002.—ED. J.G.L.

The accounts accompanying the report consist of the usual statements. The first two relate to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £5,761,885 of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,547,965. The third statement is the capital account. It stands as follows: Amount received, £4,190,124 6s. 8d.; nominal amount added by conversion (less premium), £3,119,725 13s. 4d.—total, £7,309,850. The items of expenditure are as follows:—

Capital account to June 30, 1900			£3,981,427 5 2
Expenditure during half year to Dec. 31, 1900, viz.—			
New buildings and machinery in extension of works	£22,795 14 1		
New and additional mains and services	25,076 1 4		
New and additional meters	18,725 9 5		
New and additional stoves	23,383 5 2		
	£90,980 10 0		
Cr.—Sale of dry dock	11,778 3 7		
		79,202 6 5	
Total expenditure			£4,060,629 11 7
Balance			129,494 15 1
			£4,190,124 6 8
Nominal amount added by conversion, less premium			3,119,725 13 4
Total			£7,309,850 0 0

The following is the revenue account:—

Receipts.

Sale of gas—			
Michaelmas at 2s. 8d. per 1000 feet	£244,953 6 3		
Christmas at 2s. 8d. per 1000 feet	404,005 10 7		
	£648,958 16 10		
Public lighting and under contracts, including lighting, repairing, materials, &c., £15,032 14s. 11d.	30,114 8 11		
		£679,073 5 9	
Meters in use (216,241)—			
Company's meters at rent: Ordinary, 95,874; slot, 109,586	£21,457 18 3		
Company's stoves at rent: Ordinary consumers, 50,756; slot meter consumers, 87,103; fires, 12,057	17,170 16 11		
		38,628 15 2	
Residual products—			
Coke, less £703 12s. 9d. for cartage; £13,555 0s. 11d. for labour, &c.	£250,899 8 9		
Breeze, less £411 13s. 5d. for cartage; £3220 11s. 5d. for labour, &c.	10,772 11 1		
Tar, less £133 16s. for cartage; £149 18s. 6d. for laoour, &c.	31,405 15 2		
Ammoniacal liquor, less £220 17s. 3d. for labour, &c.	10,975 2 9		
Sulphate of ammonia, less £8000 7s. 4d. for acid, &c.; £3015 2s. 4d. for labour, &c.	30,899 2 0		
		334,952 19 9	
Rents receivable		1,235 10 11	
Transfer fees		04 5 0	
Total receipts		£1,053,954 16 7	

Expenditure.

Manufacture of gas—			
Coal into store, including cost of petroleum spirit for enriching and including £27,440 8s. 11d. for labour	£552,701 15 5		
Purification—including £8301 15s. 7d. for labour	27,555 14 11		
Salaries of Engineer and Officers at works	7,974 11 7		
Wages (carbonizing)	61,239 16 11		
Repairs and maintenance of works and plant, including £48,163 11s. 7d. for labour, less £2799 14s. 7d. received for old materials	97,490 16 9		
		£747,012 15 7	
Distribution of gas—			
Repair, maintenance, and renewal of mains and service-pipes, including £15,394 9s. 3d. for labour	£24,042 8 2		
Salaries and wages of officers, including Rental Clerks	11,680 2 2		
Repairing and renewals of meters, including £2183 1s. 11d. for labour	12,995 2 11		
Repairing and renewals of stoves, including £6199 1s. 6d. for labour	15,651 2 8		
		64,368 15 11	
Public lamps—			
Lighting and repairing, including £9643 6s. 5d. for labour		15,032 14 11	
Rents, rates, and taxes—			
Rents payable	£940 1 9		
Rates and taxes	30,511 14 0		
		31,451 15 9	
Management—			
Directors' allowance	£1,791 1 6		
Salaries of Secretary, Accountant, and Clerks	2,299 2 4		
Collectors	9,081 6 9		
Stationery and printing	2,343 7 9		
General charges	5,048 6 8		
Company's Auditors	112 10 0		
		20,675 15 0	
Law charges	£575 14 0		
Parliamentary charges	3,941 11 2		
		4,517 5 2	
Bad debts		1,932 12 0	
Pensions and officers' and workmen's superannuation, sick, and accident funds		5,067 13 0	
Gas Referees and Official Auditor		227 13 5	
Total expenditure		£890,287 0 9	
Balance carried to net revenue account		163,667 15 10	
		£1,053,954 16 7	

The net revenue account stands as follows:—

Balance from last account			£153,689 0 2
Less dividend for the half year ended June 30, 1900	£150,150 5 4		
Divisible profit carried to reserve fund	1,880 12 7		
		152,330 17 11	
		£1,358 2 3	
Amount from revenue account		163,667 15 10	
Interest on banker's balances		465 9 3	
		£7,455 15 4	
Interest on temporary loan and deposits		23,219 9 6	
" on debenture stock		134,810 2 6	
Balance applicable to dividend on the ordinary stock			

Following this are the statements relating to the reserve, renewal, and

insurance funds. They show that the balances on Dec. 31 were as follows: Reserve fund, £133,405; renewal fund, £20,286; insurance fund, £54,295. The statements relating to manufacturing operations are as follows:—

Statement of Coal Used, &c.

Description.	In Store June 30, 1900.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1900.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	122,462	571,515	557,923	455	135,599
Cannel	987	..	*65	..	922
Total . . .	123,449	571,515	557,988	455	136,521

* 134,299 gallons of petroleum spirit used as a substitute for cannel.

Statement of Residual Products.

Description.	In Store June 30, 1900.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1900.
Coke—cwts.	202,577	6,913,075	1,641,271	5,068,281	406,100
Breeze—yards	4,946	147,677	35,563	105,761	11,299
Tar—gallons.	329,648	5,215,300	275,432	4,598,543	670,973
Ammoniacal liquor—butts	26,568	175,430	119,358	47,252	35,388

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
5,529,531	199,935	4,958,953	5,232,163	21,635

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the year as follows: Coal and enriching materials, £134,599; coke and breeze, £21,717; tar, sulphate, and ammoniacal liquor, £15,068; and sundries, £183,647. The figures this time last year were: Coal, &c., £26,811; coke and breeze, £11,517; tar, &c., £12,750; and sundries, £162,392. A sum of £15,454, workmen's bonuses and savings, has been deposited with the Company; and the total of the officers' superannuation and guarantee funds is £31,001. The figures this time last year were £33,025 and £39,008.

Metropolitan Gas Company of Melbourne.—The profits of this Company for the half year ending Dec. 31 were £59,000, and a dividend of 4s. per share has been declared. A sum of £20,000 has been placed to the reserve fund, and a balance carried forward of £13,100. Dividends were payable in Melbourne yesterday, and we learn from the Company's London agents (Messrs. John Terry and Co.) that they would be posted by the first mail after that date.

Elland Gas Company's Bill.—The combined Local Authorities of Elland, Greetland, and Stainland, who have decided to oppose the Bill of the Elland Gas Company, desire an increase in the illuminating power of the gas, better facilities for testing its quality, and a reduction of the standard price. It appears that they have been satisfied on the first point by the power being raised from 14 to 15 candles. The other matters will probably be contested before the Parliamentary Committee, especially that relative to the lowering of the standard price, which is now 4s., to 3s.

Opposition to the Dover Gas Bill Withdrawn.—In connection with the Bill which the Dover Gas Company are promoting in Parliament, the Corporation have made an ineffectual attempt to secure a reduction of 10 per cent. in the charges for gas consumed by them—the Company having absolutely declined to agree to anything of the kind. At a recent meeting of the Council, the Town Clerk said he had been advised that Parliament would not grant a concession of this sort; and therefore he recommended that the Corporation should not oppose the Bill. After some discussion, it was decided to withdraw the opposition.

Gas Workers' Union and the Trades Federation.—In the paragraph on the above subject which appeared in the "JOURNAL" last week, it was stated that the result of the ballot lately taken on the question of severance was announced at a meeting of the Union held in London on the 27th ult., but not made known to the public. It has, however, since been published; and we find that 10,714 members are in favour of withdrawing from the Federation, while 5527 are against this course. The poll was a small one, and therefore the General Council, as already mentioned, are arranging to obtain a more definite expression of opinion on the matter by the members. It is expected that a conference will be held some time in April.

Hull Gas and Water Supply.—At a meeting of the Gas and Water Committee of the Hull Corporation last Wednesday, the Engineer (Mr. F. J. Bancroft) presented the estimates of receipts and expenditure in connection with the water undertaking for the year ending March 31, 1902. The receipts were estimated at £56,670, and the expenditure at £30,781; showing a gross profit of £25,889. Out of this £2600 would be contributed to the city fund, and £13,585 for the sinking fund and interest, leaving a net profit on the year of £9706. From the gas undertaking the Engineer estimated the receipts would be £14,963, and the expenditure £10,635; the gross profit being £4328. Out of this there would be deducted for interest and sinking fund £3800; leaving a net profit of £528. He expressed the opinion that the Committee might safely reduce the price of gas from 2s. 10d. to to 2s. 8d. per 1000 cubic feet. It was decided to adopt the estimates and recommendations.

ELECTRIC LIGHTING NOTES.

The Electric Lighting Committee of the Portsmouth Corporation have decided to recommend the Council to borrow £24,478 for electric lighting works extensions. A considerable sum of the money has already been expended.

With a view to a greater demand, the Electricity Committee of the Islington Borough Council recommend that, at the expiration of the present quarter, the price for current during the hours of daylight be reduced from 3½d. to 2d. per unit.

The Newark District Council yesterday week adopted a scheme of electric lighting, propounded by Mr. Vesey Brown, and estimated to cost not exceeding £30,000. Application is to be made to the Local Government Board for sanction to a loan of the amount named.

With the view of increasing the number of consumers in the old town, and raising the efficiency of the electricity supply system as a whole, the Electrical Engineer to the Hull Corporation has recommended certain alterations of the Dagger Lane station, which are estimated to cost £17,000. The Electric Lighting Committee have adopted the proposals.

The Town Council of the newly incorporated borough of Swindon are about to ask Parliament for powers to enable them to establish a system of electric lighting and traction, and, though a meeting of the Traders' Association has expressed approval of the idea, there is a very large and influential body of public opinion against it. It is felt that the *pros* and *cons* of the matter have not been fully placed before the public; and steps are being taken to hold a meeting of ratepayers to oppose a scheme which very many people consider is not required, and will result in placing a heavy burden on the rates. It is true that the population of the town has increased in ten years by something like 20,000; but the major portion of the adults are working men who live within a very short distance of the scene of their labours—the Great Western Railway Works. These people, therefore, are in no need of trams, and it is felt very strongly that, unless lighting and traction are worked together, the introduction of electricity for the former would mean a serious expenditure, with little, if any, prospect of a profit being earned.

We take the following from the "Lincoln Chronicle" for Friday last: "The lighting of Lincoln by electricity, we were told by the sapient individuals who were anxious for its introduction, would not only brighten our streets, but quickly prove a remunerative undertaking, from the fact that shopkeepers would unanimously adopt the new method of lighting for their business premises, and private people for their homes. We all know how the streets have been 'lighted.' Notwithstanding the constant overhauling of the standards by men perched on a moveable scaffolding, which, in itself, is a nuisance, the light has always been uncertain. To coin a word, the lights constantly 'bob' up and down, and even when full on do not approach the gas in power, where sufficient incandescent mantles are used. But that is not the worst. Comparing the cost of electric and gas lighting during the past year, it is found that the inefficient electric light is costing the citizens close upon £500 per annum more than the gas. The result of this will, of course, be a further addition to the borough rate; and householders may certainly look for the next rate being raised something like 4d. in the pound."

On the invitation of the Yeadon District Council, a conference of representatives of local authorities in the Wharfedale Union was held on Monday last week in the Guiseley Town Hall, for the purpose of discussing the proposals of the Yorkshire Electric Power Company, who have lodged a Bill in Parliament asking for powers to supply electricity in bulk over a large portion of the West Riding, including most of the district covered by the Wharfedale Union. The authorities represented were the Yeadon, Guiseley, Rawdon, Horsforth, and Ilkley District Councils, and the Menston Parish Council. The proposals of the Company were fully explained by Mr. A. G. Lupton, the Chairman; and to meet one most important objection of the authorities, he volunteered on behalf of the promoters to insert the following clause in the Bill: "Nothing in this Act shall prejudice any application by any local authority for a Provisional Order under the principal Acts for power to supply energy within their district." The Bill, he also explained, was entirely for the purpose of selling electricity in bulk. The Company would not be able to sell to any individual for lighting; but, with the consent of a local authority, they would have power to sell electricity to individuals for motive power. Altogether, the meeting seemed favourable to the proposals; but it was decided that each Council should discuss the matter separately, and report at a further joint meeting.

RHYMNEY WATER ARBITRATION.

Surveyors' Institution, London—Friday, Jan. 25.

(*Before Mr.* C. HAWKSLEY, M.Inst.C.E., Umpire.)

This was an arbitration to decide the amount to be paid by the Rhymney and Aber Valleys Gas and Water Company for the domestic water portion of the business of the Rhymney Iron Company, Limited. Mr. REGINALD E. MIDDLETON was Arbitrator for the Iron Company; Mr. E. M. EATON for the Water Company.

The Hon. J. D. FITZGERALD, and Mr. C. S. ASHWORTH JAMES appeared for the Iron Company; Mr. BAGGALLAY, and Mr. TREVOR LEWIS for the Gas and Water Company.

Mr. FITZGERALD, in opening, said the arbitration was held under the Rhymney and Aber Valleys Gas and Water Act, 1898, which incorporated the Company and authorized them to acquire the undertakings of various Gas and Water Companies in the Rhymney and Aber Valleys, including the water undertaking of the Rhymney Iron Company, and to construct considerable new works to supply water to persons within their area of supply. The 43rd section enacted that the Company should purchase the portion of their existing works and property which were used for the supply of water for domestic purposes, other than for stables and horses, within the limits of the Act, and their water-works,

mains or pipes, lands, waters, sources of water, agreements, rights and privileges, plant, stores, works, and conveniences in connection with such supply within the limits of the Act, including the Blaen Rhymney reservoir, the filter-beds, and service tanks, but excluding the feeder from the Rhymney River to the Bute Town reservoir, upon such terms and conditions as might be mutually agreed upon, or, failing agreement, as might be determined by arbitration under the Lands Clauses Act, provided that the Gas and Water Company should be entitled to use the feeder for the purposes for which it was now used, in common with the Iron Company, during the construction of works authorized by the Act. Then section 44 provided that, on payment or satisfaction by the Company of the price or consideration, the works and property so conveyed should become absolutely vested in the Water Company, provided that, until the completion of the purchase, the Water Company should not supply water within the limits of the Rhymney Urban District Council, nor interfere with the waters of the River Rhymney or the Pitgwellt Brook. The Rhymney Iron Company were established about 1836; their primary object being to erect large iron-works and furnaces. They acquired about 1150 acres of freehold estate (on which the town of Rhymney now stood) and other leasehold land from the Duke of Beaufort and the Marquis of Bute; the total area being between 2500 and 3000 acres. As soon as the works were established the inhabitants grew; and in a very few years Rhymney had a population of 8000, composed almost entirely of people connected with the Rhymney Iron Company. Having regard to the large population which had sprung up in connection with the works in 1866, the Iron Company determined to establish water-works for domestic supply. What was purchased under the arbitration was the Rhymney reservoir, with the water rights connected therewith, the filter-beds just above the Bute Town reservoir, a water-tank, and the mains to the town of Rhymney and the little village of Pontlottyn. The actual feeder or aqueduct from the sluice on the River Rhymney to the filter-beds was not included in the sale; but the right to take water from it (and so from the river), for the purposes of this domestic supply, until the Company had constructed their own water-works, was. By means of the new water-works, the Water Company would eventually take the water to which the Iron Company were now entitled; hence the importance of section 44 of the Act, which said that, until the Gas and Water Company had purchased the water undertaking of the Iron Company, they were not to supply water in the urban district of Rhymney, nor interfere with the waters of the River Rhymney, or the Pitgwellt Brook. The initial expenditure on the water-works was about £10,000; but there had been certain further expenditure on the works, which, however, could not be traced. The rates charged were very low indeed—the reason probably being that the great bulk of the consumers were tenants of the Company; and the arbitrators would have to consider whether it was not reasonable to make an allowance in respect of the increased income which the Iron Company might derive if they chose to raise their rates (say) to the level of those the Water Company were actually charging.

The UMPIRE: They are not bound to rates; they are voluntary rates.

Mr. FITZGERALD: They are not a statutory Company, and so they can charge any rate they like. Continuing, he said the number of houses actually supplied by the Company was 1912; and the estimated population, 9500. Turning to the tables (which were practically agreed between the accountants), he said the grand total of the charges by scale and agreement for the year ending March 31, 1900, amounted to £987 gross. To that there had to be added certain sums—the first being £28 6s. for water supplied to the staff of the Company. The staff were paid a certain salary, and got their house and water free; and if that were not the case, they would, of course, get higher wages. The accountants had taken out the rateable values of the houses, and thus calculated the rents, on which they reckoned the charges that would be made if the water were charged for directly. Then there were the Mardy stables, which were supplied from the domestic supply works, for which £10 was allowed. The remaining item was £38 15s., for 2,326,800 gallons, at 4d. per 1000 gallons; this being water taken from the domestic water-mains for domestic use in various parts of the works. These additions made the gross rental £1064 6s. The expenses in the year were: Maintenance of reservoir and filter beds, £45 1s. 4d., or 4·33 per cent. of income; inspector, turncock, plumbing, and repairs of mains and services, £41 9s. 2d., or 3·98 per cent. of income; rent (water-rights), £25, or 2·40 per cent. of income; rates, £88 14s. 8d., or 8·52 per cent. of income; collector and clerk, £15, or 1·44 per cent. of income; and stationery and printing, £2 2s., or 20 per cent. of income. Making these deductions left the net profit for the year, £824; the figure for the year before being £817, and for the previous year £837. The bulk of the water-works were on leasehold land, and so the purchasers would get a leasehold reservoir, a leasehold filter-bed, and a leasehold water-main as far as the town of Rhymney (the other mains being on freehold land), and water-rights, which they could use in connection with these works, running for the same period as the unexpired portion of the lease of the land. The question was at what rate they would capitalize the income in these circumstances. If the land had been freehold, he should have suggested 30 or 33 years' purchase; but as the leases had only about 15 years to run, he suggested 12 or 13 years as the right figure. In conclusion, he said that, in connection with the water used for domestic purposes, a rent of £25 per annum was paid to the Marquis of Bute. A lease for the purpose was actually prepared and agreed on in 1867 or 1868; but it had never been executed. The rent had, however, always been paid under it; and he claimed therefore on the basis that he was exactly in the same position as if the lease had been executed.

Mr. *William Smith*, General Manager of the Rhymney Iron Company, gave evidence in support of Counsel's opening statement. The total sum expended on the works he estimated at £15,000 or £17,000. Since 1867, the Company had supplied the town of Rhymney and Pontlottyn with water; and the supply had been satisfactory and sufficient. The works were sufficient to continue the supply as at present, and to go on earning the income. They could also be easily enlarged at little expense; no further rights having to be obtained. The Company had water rights from the Duke of Beaufort as well as the Marquis of Bute

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 325.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 12	10½	Alliance & Dublin 10 p.c.	19—20	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13½—14½	..	5 3 5
300,000	100	Jan. 2	5	Australian 5 p.c. Deb.	99—101	..	4 19 0
200,000	5	Nov. 14	6	Bombay, Ltd.	6—6½	..	4 12 4
40,000	5	,,	6	Do. New, £4 paid	4—4½	..	5 6 8
380,000	Stk.	Aug. 15	12	Brentford Consolidated	257—262	..	4 11 7
270,000	,,	,,	9	Do. New	183—188	..	4 15 9
50,000	,,	,,	5	Do. 5 p.c. Pref.	130—135	..	3 14 1
159,375	,,	Dec. 13	4	Do. 4 p.c. Deb.	112—115	−3	3 9 7
220,000	Stk.	Sept. 14	10	Brighton & Hove Orig.	220—230	..	4 6 11
226,320	,,	,,	7	Do. A. Ord. Stk.	150—160	..	4 7 6
1,009,500	Stk.	Aug. 29	5	Bristol, 5 p.c. max.	121—123	..	4 1 4
420,000	20	Sept. 28	10	British	39—41	..	4 17 7
50,000	10	Aug. 15	12	Bromley, Ord. 10 p.c.	24—26	..	4 12 4
79,000	10	,,	9	Do. 7 p.c.	19—21	..	4 5 8
500,000	10	Oct. 12	6	Buenos Ayres (New) Ltd.	8½—8¾	..	6 17 2
220,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	95—98	..	4 1 8
150,000	20	July 12	8½	Cagliari, Ltd.	23—25	..	6 12 0
100,000	10	Sept. 28	8	Cape Town & Dis., Ltd.	13½—14½	..	5 10 4
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
550,000	Stk.	Oct. 12	12½	Commercial Old Stock	275—280	..	4 11 1
236,425	,,	,,	9½	Do. New do.	207—212	..	4 12 0
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	132—137	..	3 5 8
800,000	Stk.	Dec. 13	9	Continental Union, Ltd.	160—165	−3	5 9 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	160—165	−3	4 4 10
555,000	Stk.	Aug. 15	5½	Crystal Palace Ord. 5 p.c.	117—122	..	4 6 1
60,000	,,	,,	5	Do. 5 p.c. Pref.	130—135	..	3 14 1
486,030	10	Jan. 31	11	European, Ltd.	18—19*	..	5 15 9
354,060	10	,,	11	Do. £7 10s. paid	13½—14½*	+½	5 13 9
15,079,885	Stk.	Aug. 15	4 1/16	Gas-light and Coke	4 p.c. Ord.	98—100	..	4 8 0
					3½ p.c. max.	91—93	−1	3 15 3
					4 p.c. Con. Pref.	115—118	..	3 7 10
					3 p.c. Con. Deb.	91—93	..	3 4 6
2,600,000	,,	,,	3½	Hongkong & China, Ltd.	13—14	..	5 14 4
3,799,735	,,	,,	4	Imperial Continental	203—208	..	4 16 2
4,063,425	,,	Dec. 13	3	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
70,000	10	Oct. 26	8	Liverpool United A	232—234	..	4 5 6
3,800,000	Stk.	Nov. 14	10	Do. do. B	173—175	..	4 0 0
473,600	Stk.	Aug. 15	3½	Do. do. Deb. Stk.	120—122	..	3 5 7
561,000	Stk.	Aug. 30	10	Malta & Medn., Ltd.	4¾—5¼	..	5 14 3
678,100	,,	,,	7	Met. of 5 p.c. Deb.	105—108	..	4 12 7
306,083	,,	Dec. 28	4	Melbourne 4½ p.c. Deb.	104—106	..	4 4 11
75,000	5	Dec. 13	6	Monte Video, Ltd.	9½—10½	..	6 13 4
560,000	100	Oct. 1	5	Newc'tle & G'tesh'd Con.	224—226	..	4 1 10
250,000	100	,,	4½	Do. 3½ p.c. Deb.	101—102	..	3 8 8
541,920	20	Nov. 14	3½		*Ex. div.		
667,946	Stk.	Aug. 30	9½				
299,855	Stk.	Dec. 28	3½				

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
150,000	5	Nov. 29	8	Oriental, Ltd.	7—7½	..	5 6 8
135,000	5	,,	8	Do. New, £4 10s. pd.	5½—6	..	6 0 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1⅝	..	4 11 5
60,000	5	Sept. 28	7	Ottoman, Ltd.	5—5⅜	..	6 7 3
851,070	10	Oct. 12	7	River Plate Ord.	10—10½	..	6 13 4
250,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
250,000	10	Sept. 28	8	San Paulo, Ltd.	11—12	..	6 13 4
135,000	Stk.	Sept. 14	10	Sheffield A	232—236	..	4 4 9
209,700	,,	,,	10	Do. B	232—236	..	4 4 9
447,427	,,	,,	10	Do. C	232—234	..	4 5 6
5,641,885	Stk.	Aug. 15	5½	South Met., 4 p.c. Ord.	134—137	+1	3 17 10
1,520,000	,,	Jan. 16	3	Do. 3 p.c. Deb.	93—95	..	3 2 6
380,940	Stk.	Nov. 14	5	Southampton Ord.	105—110	..	4 10 11
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
120,000	Stk.	Aug. 30	6	Tottenham A. 5 p.c.	113—118	..	5 1 8
250,520	,,	,,	4½	and B. 3½ p.c.	85—90	..	5 0 0
61,550	,,	Dec. 13	4	Edmonton 4 p.c. Deb.	107—112	..	3 11 5
182,380	10	Jan. 16	5	Tuscan, Ltd.	7½—8½	..	5 17 8
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—102	..	4 18 0
				WATER COMPANIES.			
780,499	Stk.	Dec. 28	11	Chelsea, Ord.	303—308	..	3 11 5
150,000	,,	,,	5	Do. 5 p.c. Pref.	155—160	..	3 2 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	142—145	..	3 2 1
175,785	,,	Sept. 28	4½	Do. 4½ p.c. Deb.	143—148	..	3 0 10
1,720,560	Stk.	Oct. 12	7	East London, Ord.	193—198	−1	3 10 8
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	147—152	..	2 19 3
797,687	,,	,,	3	Do. 3 p.c. Deb.	94—96	−1	3 2 6
700,000	50	Dec. 13	8	Grand Junction 10 p.c. max.	109—112	..	3 11 5
310,000	Stk.	Sept. 28	4	4 p.c. Deb.	130—135	..	2 19 3
708,000	Stk.	Aug. 30	14	Kent	303—308	..	4 10 11
160,000	,,	,,	7	Do. New, 7 p.c. max.	200—210	..	3 6 8
1,043,800	100	Dec. 28	10½	Lambeth, 10 p.c. max.	290—295	..	3 11 2
406,200	100	,,	8	Do. 7½ p.c. max.	208—213	..	3 15 1
350,000	Stk.	Sept. 28	4	Do. 4 p.c. Deb.	127—130	..	3 1 7
500,000	100	Aug. 15	14	New River, New Shares	415—420	..	3 6 8
1,000,000	Stk.	Jan. 31	4	Do. 4 p.c. Deb.	127—130*	..	3 1 7
902,300	Stk.	Dec. 13	7	South-wark and 5 p.c. Pref.	Ord.	193—198	..	3 10 8
126,500	100	,,	7		7½ p.c. max.	175—180	..	3 17 9
489,200	Stk.	,,	5		4 p.c. A Deb.	155—160	..	3 2 6
1,019,585	,,	Oct. 12	4	Vauxhall		125—130	−3	3 1 7
1,155,066	Stk.	Dec. 13	10	West Middlesex		280—290	..	3 9 0
200,000	,,	,,	4½	Do. 4½ p.c. Deb.		140—145	..	3 2 1
200,000	,,	Sept. 14	3	Do. 3 p.c. Deb.		98—100	..	3 0 0
						*Ex. div.		

which practically gave them all the water in the valley, though only the water rights of the latter were affected by the present proceedings. The domestic portion of the water-works of the Iron Company was only a small part of the Company's business; but it was of great value to the Company, because it enabled them to keep their houses pretty well occupied by charging so little for the water as to attract workpeople. There was no relation between wages and water-rates—the workmen being paid the wages current in the district; but there was a relation between water-rates and rents, because, if the rates were raised, rents would have to be reduced. The charges of the Iron Company for water were enormously below those of the Gas and Water Company. As to the maintenance of works, the Company had a large staff in their employ for other purposes, and therefore could do work of maintenance, &c., much more cheaply than even a water company.

In cross-examination by Mr. BAGGALLAY, witness said the mains were sound, and only leaky to the extent one would expect in a mining district. There had been complaint regarding the water in an open cutting. If the Water Company had let the Iron Company alone, no doubt they would have covered it in. He could not say the actual amount expended on repairs of mains and services, because the work was done by the men forming the general staff of the Company. The brick-yard had not been working for five years. There was an allowance of 360 gallons a day for engines there. New boilers would soon be put in, and work started again. A good many figures as to consumption in various parts of the works were pure estimates.

By Mr. EATON: The water concern was managed by witness and others connected with the works; and really some charge should be made for their services.

Mr. FITZGERALD at this point announced that the accountants had agreed that the gross profits for 1898 were £1039; for 1899, £1040; and for 1900, £1041.

The UMPIRE asked whether there would be any evidence with regard to the right, as against third parties, to take this water from a running stream. The water was taken, and had been taken for a good many years, and he did not know whether a right had yet been obtained by prescription.

Mr. FITZGERALD: If by no other way, a right has been acquired by thirty years' user.

Mr. BAGGALLAY: To what extent—what quantity?

Mr. FITZGERALD: The quantity of the works that are at present in existence.

Mr. BAGGALLAY, after further discussion, said he did not think the case was quite so clear as Mr. FitzGerald assumed. He did not say Mr. FitzGerald was wrong; but he thought there was a great deal more in it than that gentleman thought at present.

Mr. FITZGERALD said all the Court had to value was these water-works, together with a right to take water for the period of the lease. As he understood, Mr. Baggallay suggested that during the currency of the lease the right to take water might be questioned by some one lower down the river; but in an arbitration under the Lands Clauses Act, no question of title could go before an arbitrator.

Mr. BAGGALLAY agreed that the question of title could not be determined by the present Court; but as a matter of procedure, there might be a very important point as to the form in which the award should be made, in order to avoid such a difficulty as arose in the Kirkleatham case. There were two doubtful questions here—one as to the right to divert the water, the other as to the validity of the agreement for the lease. The latter might go to the root of the valuation, because, if the agreement was not good, it would reduce the tenure to a yearly tenancy. He suggested an adjournment to take the opinion of a Court.

Mr. FITZGERALD said that would involve great delay. The proper time to raise a question of procedure was when they had got to the end of the evidence. He felt no doubt about it, or the legal position. His friend might put forward reasons why the arbitrators should declare their award in alternative form.

The subject then dropped.

Witness, in re-examination, said, by means of the weir across the River Rhymney, they took the whole flow of the river in dry weather; and the weir was in practically the same condition now as thirty or forty years ago. Similarly, the Blaen Rhymney reservoir intercepted the whole flow of the Pitgwellt Brook; and that reservoir had been in existence for more than thirty years. The right of the Company to divert these waters had never been challenged. All the water from the works ran into the River Rhymney, and the stream was much polluted. He did not know that below the town it could be used—certainly not for boiler purposes.

Mr. *Drew*, of Messrs. Lass, Wood, and Drew, Accountants, who had prepared the tables based on the accounts of the Company, said the amounts put down for maintenance did not appear in the books; they were a proportion of men's wages, and had been arrived at by calculating what was a fair proportion of the men's wages to charge to this work. The same applied to the item of "inspector, turncock, plumbing, and repairs of mains and services."

In cross-examination, witness said there were no special officials in connection with the water concern. In 1898, 1899, and 1900 there was nothing set down for law charges.

Mr. *Henry Rofe*, Water Engineer, examined by Mr. FITZGERALD, said the water-works of the Rhymney Iron Company used for domestic supply consisted of the Blaen reservoir, the conduit leading to the filter-beds, the subsiding-tank and filter-beds, the mains into the town, and the distributing pipes. The Blaen reservoir had a capacity of 5 million gallons, the drainage area to which was 640 acres—the drainage area to the intake being 160 acres and to the conduit 76 acres. The average rainfall was very high, 36 inches. The population supplied was estimated at 9500, who, at 15 gallons per head, would require 142,000 gallons daily. The existing works were capable of giving this supply with, even in time of drought, 10,000 gallons daily to spare.

Mr. BAGGALLY, in reply to Mr. FITZGERALD, said he was not going to attack the sufficiency of the water, nor the quality after filtration; but as a matter of precaution, the conduit ought to be covered in.

Witness, further examined, said that in his valuation he commenced with the figure of £824, the net revenue calculated for the year 1900; the

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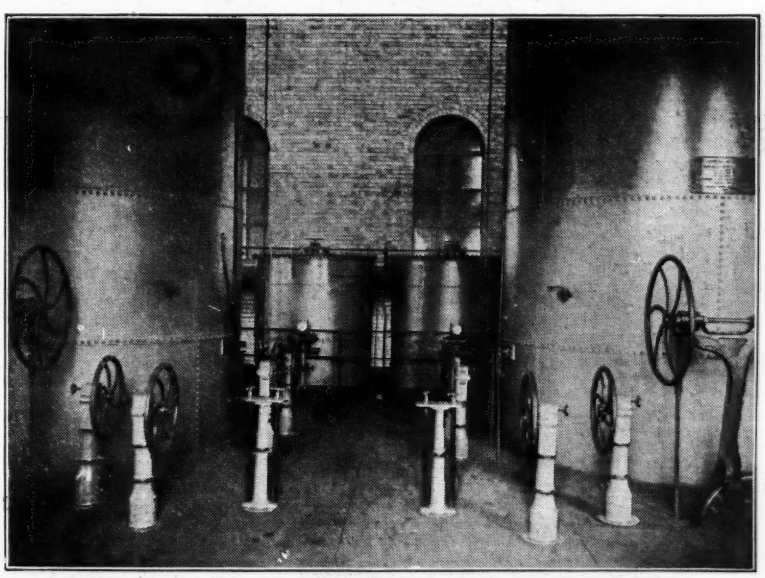

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difference between that figure and the gross profit, amounting to 21 per cent. of the income, being ample for the total working expenses in a concern of this kind. Here there were no statutory powers; and the sources of supply would only endure for a limited number of years—namely, 15. So that, on the 3 per cent. table, the multiplier would be 11·94, which would produce £9838 5s. He added nothing for the fact that a portion of the undertaking was on freehold property. The Iron Company's charges were very low; if raised to the level of the Gas and Water Company, they would increase the revenue by 50 per cent., and add £4961 to the value of the undertaking. He included nothing for the purchase being compulsory, because, in putting the income on the 3 per cent. table, he had made allowance for that.

Cross-examined by Mr. BAGGALLAY: The allowance of 21 per cent. was quite ample for the expenses in a concern like this. The 21 per cent. would include cost of management, collection, offices—in fact, everything. He agreed that nothing was put down for sand for filter-beds, or for material used in repairs of mains and services. Something should be. The multiplier of 11·94 was based on instructions that the Iron Company had the water rights they claimed, and that they had the equivalent of a lease from the Marquis of Bute. If either the rights or the tenure were precarious, the 11·94 would have to be altered. It was quite practicable to materially raise water-rates after having charged at a given rate for a considerable number of years; and it was done occasionally. He had never before had anything to do with the transfer of a water concern on leasehold property. He selected the 3 per cent. table in the exercise of his judgment; and, in the circumstances, he thought it was fair.

Mr. *George R. Strachan*, examined by Mr. FITZGERALD, said he was a Water Engineer, and had inspected the works in question. He agreed with Mr. Rofe that from these water-works a supply of water for domestic purposes for the existing population could be obtained. He took £830 as the existing net revenue of the Company by averaging the figures for 1898 and 1900, leaving out those for 1899, as there were said to be special circumstances in that year—the rates being abnormally high owing to the strike. As to the amount charged for repairs, this was a special case, and he had no experience which exactly corresponded with it. He looked first at the water charges of the Company, and found they were low; and then at the 21 per cent., which included the water rent of £25. Whereas 20 or 21 per cent. would be a fair charge for an undertaking of this kind, yet, as compared with the low charges, it looked small. Against that, he set off the fact that the Company could manage the concern much more cheaply than it could be managed as a separate undertaking; so that, as far as he could judge, the 20 or 21 per cent. seemed to be proper. He also had regard to the fact that the term of the lease unexpired was short; and he assumed therefore that the standard of maintenance would not be so high as for a concern held in perpetuity. Having been instructed that there was an absolute right to take water, he thought the income of £830 was worth purchase on the 3 per cent. table, which, as the lease had 15 years to run, produced £9908 10s. He added nothing in respect of the freehold portion of the undertaking —regarding that as additional security. The water charges being low they could, without injustice, increase them; but whether that would be politic, he did not know. He had added nothing for the sale being compulsory, or for prospective profit; but something should be added for disturbance and reinvestment.

In cross-examination, witness agreed that something should be allowed for renewal of filter-beds; but 4·33 per cent. of income was a large figure for maintenance of reservoir and filter-beds. There should also be some allowance for materials over and above wages.

Mr. FITZGERALD, in reply to Mr. MIDDLETON, said that when the leases terminated, the land, and the works on the land, would revert to the Marquis of Bute, together with the water-rights, but not the right to supply, because the persons supplied did not live on his estate, and the works—the mains and pipes—by which the supply was given were not on his estate. The mains were on the Company's freehold land.

Mr. BAGGALLAY: And at the same moment the freehold part would be left with mains upon it and no water.

Mr. FITZGERALD: Quite so, unless they made an arrangement.

Mr. BAGGALLAY: So that, unless other provision is made, for a time they would have to be used for the supply of this district.

Mr. MIDDLETON: Not necessarily, I think. I wanted to know whether the people themselves were free to go for another supply, or whether they had to continue to take the water from the Marquis of Bute. Apparently they are perfectly free to go to any other place.

Mr. FITZGERALD: Perfectly free.

Mr. BAGGALLAY: Quite free before the passing of this Act. What are we going to do about this question of the rights?

Mr. FITZGERALD: What happened in the Kirkleatham case was that eventually the Arbitrator or Umpire stated his award in the alternative. The question there was entirely what was the basis of valuation on the admitted facts; it was the question of the construction of an Act. He stated his award in the alternative, which was a very proper course to adopt.

Mr. BAGGALLAY: We do not want to go to the Court to have it sent back, that is all.

Mr. FITZGERALD: That is not the point here. There is no question as to the basis of our valuation. The question here with my friend is that my title is not good; and he is suggesting this for two reasons—one that I am not in a position to say I have 15 years of a lease to run, and the other that, even if I have, I have not a right under it that cannot be attacked by someone down below. I am not in the least afraid of either of those questions on my title. I feel assured that I have a perfectly good title for what I ask you to value; and, that being so, the duty of this Court is to value what I put before it. If my friend, when it comes to be a question of conveyancing or of enforcing the award, disputes this, he can raise the point and say he will not pay.

The UMPIRE: Suppose he disputes it now. We should have it, on the one hand, that you claim for an indisputable title; and, on the other, that you have only a title for 15 years, subject to the possibility of somebody coming in and obtaining an injunction, for instance, to restrain you from taking any of the water. If that were the case, the

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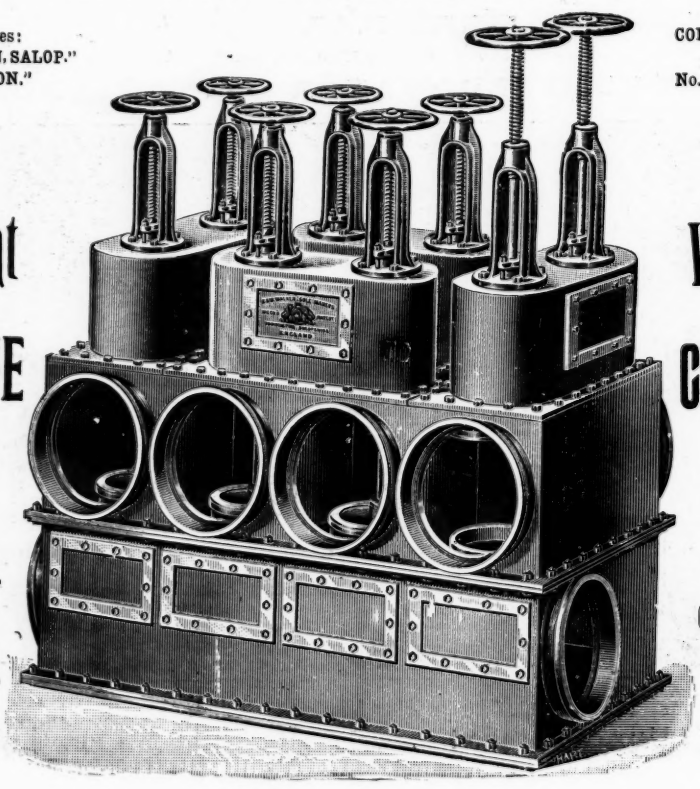

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Arbitrators, in making their award, will have to consider the chances of somebody coming in within 15 years.

Mr. FITZGERALD: No; that is not part of the duty of an Arbitrator under the Lands Clauses Act. The sole duty of an Arbitrator under this Act is to value the property which is being taken. He does not decide any question of title; leaving that to be raised afterwards when an action is brought on the award, or proceedings are taken to enforce it. If Mr. Baggallay, when he has all the facts before him, is of opinion that we have not got the property, he can say he is not bound to pay the amount of your award, and can resist payment; and if he proves we have not got the property, he will certainly be able to resist payment successfully.

Mr. BAGGALLAY: That is not really so; though in theory, it is all very well. But suppose your award does not say what rights you have assumed as your basis, I cannot raise the subject at all. I shall have to pay; and the question cannot arise until somebody brings an injunction to stop me taking the water, which may be some years hence, after I have paid the money, and cannot get it back. It is absurd to go on when you know there is this dispute as to questions of right. In this, as in the previous case, it is merely a question of construction—a question of law. One was a question of the construction of an Act; the other a question of the law with regard to the statute of limitations, and matters of that sort. It seems to go to the very basis of the valuation, because the correct position with regard to the matter must govern you in arriving at the valuation. The question ought to be absolutely determined before the award is made, or it should be distinctly understood that the award is to be made in alternative form. It ought not to be an ordinary award, in which we should be left to try and satisfy the Court that there has been a miscarriage of justice, so as to have it sent back for a restatement. This would not be at all a fair proceeding.

Mr. FITZGERALD: I did not wish to prejudice my friend's position. I did not want you to make your award in such a way that it would not be open to him to say that his contention was so and so. If necessary, no doubt you could make the award in the alternative.

Mr. BAGGALLAY: Then it is a question of title. I am not going to ask Mr. Hawksley or the Arbitrators to decide a question of law; but what I do ask him is not to accept your view that he has only got to take your statement of what you claim, and put a value upon it. That is absolutely wrong, I submit. I ask him to take the view that there is a dispute of a material character; and that he must either have this settled before he makes his award, or state his award in such a way that the matter can clearly, on the face of the award, be raised afterwards.

Mr. FITZGERALD: I should not object to that being done.

The UMPIRE: Not only raised afterwards, but decided, so that it could be raised by saying the award was on the assumption that the water exists; and also that there should be an alternative in case it should be found it did not exist.

Mr. BAGGALLAY: Yes; so as to save the expense of having it sent back to you to make a fresh award or to re-state the award.

Mr. FITZGERALD: I should not object to that.

Saturday, Jan. 26.

Mr. *Smith*, re-called, said it was the Bute Town reservoir which had been increased from its original size, not the Blaen Rhymney reservoir, as stated previously.

Mr. *F. B. Saunders*, Secretary to the Rhymney Iron Company, produced the lease from the Marquis of Bute dated July 4, 1837, and the draft lease dated 1867, but never executed; the latter relating to the payment of £25 a year for the taking of the water for domestic purposes. He also produced a letter from the Marquis of Bute's Solicitors dated Dec. 5, 1870, to the Iron Company, in which they stated that the Trustees of the Marquis never contemplated the granting of water powers to the Company upon terms of a merely nominal rent; but, upon a review of the circumstances, they were prepared to reduce the rent (which the mineral agent had fixed at £100) to £25, which they hoped would be satisfactory to the Company. This rent had been paid ever since; and witness produced last year's receipt for the amount.

This closed the evidence for the Iron Company.

Mr. TREVOR LEWIS, in opening the case for the Gas and Water Company, said both sides were pretty well agreed as to the principles on which compensation was to be paid; the sole questions between them being as to what might fairly be considered the net maintainable profits, and what number of years' purchase was applicable. He did not propose to go into the other questions which Mr. Baggallay had raised, because they were mere matters of argument which would be dealt with when the evidence was closed. As to the table purporting to show the net profits of the Iron Company's water undertaking, he contended that the amounts with which the Company credited themselves for stables and consumption at other parts of their works were mere estimates, but very liberal estimates. Then as to the cost of carrying on the water undertaking, it had been generally admitted by the witnesses that items which usually appeared, and should appear, among expenses, did not so appear; so that it was impossible really to come to a specific conclusion as to what the net profits were. In this case, he submitted that the proper way was to rely on experience to show what the working expenses would be of such an undertaking as this. Mr. Smith and Mr. Drew both said the accounts of the water business had not been kept separately. He did not quarrel with this; but it was an additional reason for judging by past experience. Mr. Rofe and Mr. Strachan both said the income ought to be capitalized on the 3 per cent. table. His (counsel's) experience had not been very great; but he had never heard of leasehold property being dealt with on these terms—the table, when dealing with leasehold property, usually being the 6, 7, or even 8 per cent. Here the property was not only leasehold, but there seemed to be no great certainty as to what were the rights of the Company to take water and supply it outside. Further elements of uncertainty were the considerable variations in rates (which were £75 one year, then £99, and then £88), the fact that the consumers were all dependent on one industry and one undertaking, and the fact that this was a mining district. Having regard to these things, he held that the 3 per cent. table was altogether inapplicable. In conclusion, he mentioned one important item which his witnesses would claim to have

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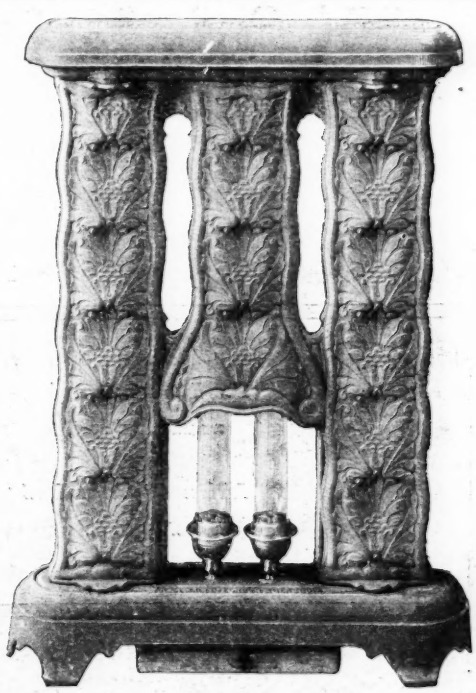

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deducted from the value of the concern—namely, the cost of piping the open conduit leading to the filter-beds, which Mr. Smith had told them would have been done if they (the Iron Company) had been left in possession.

Mr. *Togarmah Rees*, Engineer to the Rhymney and Aber Valleys Gas and Water Company, examined by Mr. LEWIS, said the domestic supply works of the Company he understood to be the reservoir at Blaen Rhymney, the weir across the Rhymney River, the conduit from the Rhymney River down to a small reservoir at Bute Town, two filter-beds, and a service tank at Bute Town from which the water was distributed by the mains. In his valuation, he took as the gross annual income that set out in the tables—£1041 10s., part of which was ascertained and part merely estimated. To obtain the net profit, he had deducted 40 per cent. for the working expenses, which left £625 as the net income. The working expenses of similar water-works in the neighbourhood were all over 40 per cent.; and even with the Western Valleys Company, where the works were all quite new, they could not keep the expenses down to 30 per cent. To capitalize the net income, he used the 5 per cent. table. The property being leasehold made it rather risky; and, but for the sale being compulsory, he should have used the 7 or 8 per cent. table. The multiplier on the 5 per cent. table (there being 15 years to run) was 10·38, which, applied to the £625, produced £6487 10s. From this he made a deduction for piping the open cut (a length of 950 yards, at 30s. a yard) of £1425; leaving £5062 10s. as his final figure.

Cross-examined by Mr. FITZGERALD: He made allowance for the sale being compulsory by taking the 5 per cent. table. He could recollect no case where he had done this before. For the open cutting, he estimated for a 15-inch pipe, though he had not calculated what such a pipe would carry. He agreed that a 15-inch pipe would not be necessary to supply 150,000 gallons daily, if there was sufficient head; but if a smaller pipe were to be used, a greater head would be required, and the weir would have to be raised. The concern was risky because it was non-statutory, and because they had no right to break-up roads; and he did not know that they had a right to supply to anyone off the leasehold land. It was true that, by the agreement with the Rhymney Urban District Council, that authority, after the purchase, were to take water from the Gas and Water Company in bulk. If they took 40 million gallons, the gross income therefrom would be £660; if they took 10 million gallons more, it would be £812 10s. He should value such an income, if perpetual, after deducting expenses and making allowance for the purchase of all interests, at 33 years' purchase.

Re-examined: If capitalizing a right to supply in perpetuity, he should have to consider whether the sources of supply were held in perpetuity. If these sources had only 15 years to run, he should not capitalize at 33 years' purchase.

By the UMPIRE: The 15-inch pipe would only be laid for the period during which the Gas and Water Company were constructing their works. After the works were finished, the pipe would be removed.

Mr. *E. K. Burstal* said his partner, Mr. E. H. Stevenson, had specially attended to the engineering of the Rhymney and Aber Valleys Gas and Water Company; but he was unable to be present to give evidence, through an attack of laryngitis. Witness, however, had been in consultation with Mr. Rees, though he had not had an opportunity of going over the works; and he put in a valuation similar to his. He did not think less than 40 per cent. of the gross income could possibly be taken to represent the working expenses. Averaging eleven companies, returns of which had been made to the London County Council, and which were supplying populations varying from 38,000 to 1300, gave a figure of 51·7 per cent.

In cross-examination by Mr. FITZGERALD, who suggested that in his abstract from the County Council returns he had ignored cases in which the expenses were low, witness said he had only picked out concerns existing in places in Wales, thinking that those cases would be more comparable with the one now being valued than others.

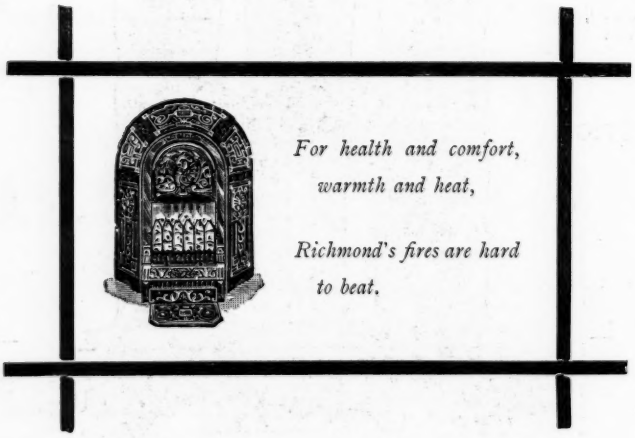
This closed the evidence; and the proceedings were then adjourned until next Saturday, when Counsel will deliver their speeches.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

There was an incident at the meeting of the Edinburgh and Leith Gas Commission on Monday last, which makes me doubt whether the Commissioners have not troublous times immediately in front of them. They had a meeting with their workmen and the representative of the Union nearly three weeks ago, which gave the opinion that the Commissioners had surrendered too easily to the Union. But possibly the reason they agreed to meet them is disclosed in the fact that at Monday's meeting Bailie Waterston—a Magistrate of the city—sharply took the Commissioners to task upon the question of why nothing had been done since the meeting with the men. Lord Provost Steel explained that they had a shorthand note taken of the proceedings at the conference, and that these notes were in the hands of the printer. They had no idea, he said, of how large a volume it was. Bailie Waterston thought they were doing an injustice to the men. Had, he remarked, the report been wanted for a newspaper, the whole of it would have been printed the next day. Mr. Mallinson also urged that the matter should be dealt with promptly; and the promise was given that when the report came into the hands of the Clerk, he would call a meeting of the Committee—giving the members two days to consider the report. This ended the incident. I confess that I do no like such an expression, in the mouth of a man who is expected to hol the scales evenly, that an injustice was being done to the men, and particularly when the expression was used before the Commissioners had reached the stage of considering the subject upon its merits. The presence in the Commission of a man who would say this in public must be a source of weakness to the Commissioners in any dealings which they may have with their workmen. If the question had been put in private, it would have had the same effect, so far as the Commissioners ar



concerned; but being put in public, it is certain to have a detrimental bearing upon the discipline of the workers.

That this has been the case already, is fully borne out by the circumstance that a hastily summoned meeting of the workmen was held on Wednesday evening, at which the men were addressed by the Union representative from Glasgow, and by a member of the Edinburgh Trades Council. There was, it is reported, considerable discussion at the meeting. It was resolved to express regret at the delay of the Commissioners in dealing with their requests, and the hope that all things would be amicably settled; but to point out that, unless a satisfactory reply were received by that day week, a meeting would be held to consider what steps would be taken to demand the same. The camel got his head in at the conference; he now wants to get a foot in. It is not nice reading to see "a satisfactory reply" being made a condition—and that, too, upon short notice—of peace among the workers; and, failing it, that there are to be "demands." The Commissioners have a delicate task before them. The question they have to decide is not one in which they should allow sentiment to sway them. Their minds should be made up upon the facts as laid before them; and most certainly I should say that any argument as to what is being paid to gas workers in other towns should have little weight with them, because the conditions of life vary greatly. What I fear is that there are individuals inside the Commission who have made up their minds already in favour of the men. Bailie Waterston told the Commissioners that, had it been a matter of sending off a deputation, a meeting would have been called at once, and the thing would have been settled there and then. An accusation like this shows where the accuser stands.

A question has cropped up in Edinburgh, which I have sometimes wondered has not arisen before—as to the testing of the illuminating power of the electric light. The Electric Lighting Committee desire to have a supply of gas for testing purposes; and they caused their Engineer to write to Mr. Herring to that effect. What a strange application. There is nothing to prevent the Electric Lighting Committee buying as much gas as they please, and having it tested every day. Similarly they cannot prevent the Gas Commissioners from appyling the photometer to their product. The reply they received, with the sanction of the Works Committee of the Gas Commission, was a suggestion that the two bodies should arrange jointly who should test both the gas and the electric light on behalf of the Electric Lighting Committee. This is probably more than they asked for, or expected. It is difficult to understand why the request should have been made, unless the Electric Lighting Committee should chance to be oblivious—which they can scarcely be—of the fact that their light is by no means of uniform power. Not to speak of the deterioration of lamps (which is the affair of the consumers), it is known to all who use electricity that the pressure on the wires is so variable that the light goes and comes to a great extent. Gas is regularly and scrupulously tested for illuminating power. Why should not electricity be?

The "demands" of the gas workers in the employment of the Corporation of Aberdeen were before the Gas Committee on Monday, when a report on the subject was submitted by Mr. A. Smith, the Engineer. This showed, in detail, the effect of the increases upon the wages of the different classes of men. The increases would be, respectively, 2s., 2s. 4d., and 3s. 6d. per week. They would, Mr. Smith reported, represent an additional expenditure of about £1120 per annum, which would be equivalent to a halfpenny per 1000 cubic feet of gas sold. There would be no advantage in paying time-and-half to all shift workers for overtime, in lieu of ½d. per hour increase of wages. With reference to season men, for whom it was asked that they be paid double time for all holidays they might work, as was done formerly, Mr. Smith reported that workmen employed in the retort-house all the year round are allowed six consecutive holidays in the year, for which they are paid; and that season men, if employed for two months previously, get the recognized annual holidays as they occur, and are paid for them, and if called upon to work on those holidays, such time is paid at ordinary rates, in addition to the day's pay due to them for the holiday. The Committee considered this report, and unanimously resolved to recommend the Town Council to reply that, in view of the present condition of the labour market, and also of the fact that no provision whatever has been made for such increase in the estimates for the year, the Council do not entertain the application in the meantime. The Committee, however, resolved to resume consideration of the matter when dealing with next year's estimates at the beginning of September. This is a stiffening of the back which gives the impression that the Committee see their way to facing a threatened strike, which I have no doubt they could do, for there are many unskilled men idle in the city, and, besides, the staff can afford to be thinned down now.

A somewhat extraordinary scene occurred at a meeting of the Kilsyth Town Council on Monday. In the first place, there was a complaint by the members as to the gas having been of bad quality the previous week. This was explained by Colonel Frew, the Convener of the Gas Committee, to have been due mainly to the quality of the coal; and he added that he would endeavour to have the complaint remedied as soon as possible. On the subject of the receiving of offers for coal coming up for consideration, Colonel Frew suggested that the Manager or any one of the Committee should be at liberty to take offers, and submit them for consideration. Mr. Hughes said it was clearly understood at their last meeting that all offers were to come through the Clerk. Mr. Shanks, a past Convener, pointed out that the Gas Acts gave powers to the convener of a gas committee which were not granted to other conveners. The convener was in the best position to know the quality of the coal; and having ascertained the prices, he was entitled to come forward with a recommendation, and then the Clerk could receive instructions. Colonel Frew said they had acted upon this basis all through. No harm could arise by the Convener, or the Manager, speaking to travellers or colliery owners, and getting prices, without having to go through the formality of the Clerk writing. The orders would be given through the Clerk; but he thought they must allow him, as Convener, and the Manager, a free hand to get quotations at any time. The Manager (Mr. W. Hamilton) here intervened, and asked to be allowed to speak as Manager. Provost Wilson refused

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him a hearing, and ordered him to sit down. This Mr. Hamilton said he would not do; and he claimed to be heard as Manager. The Provost proceeded to explain to the Council that they were in the habit of advertising for coal yearly; but they departed from this rule twelve months ago, on account of the high prices, and were now working in a hand-to-mouth fashion, until they should see whether there would be any reduction in price. If the Convener came across a party with cheaper coal than they were buying, he should ask him to send his prices to the Clerk; and the orders would be given through him. Mr. Hamilton wanted to know what the Clerk knew about coal or illuminating power. If the Clerk were to be Manager, he should resign. Then there arose an altercation between the Manager and some of the members, which ended in the Provost saying to Mr. Hamilton: "You had better retire." To this Mr. Hamilton replied: "I will retire altogether, if you like, on Monday;" and he left the room. The altercation was continued for some time longer; and it is difficult to say if anything was resolved upon, unless it may be that the Provost's view was adopted—that all offers for coal should be sent to the Clerk. We cannot take sides in a matter of this sort; but it does look strange if a Convener and Manager should be debarred from receiving offers and submitting them to the Committee, even occasionally buying coal and reporting so, when the business is conducted in the hand-to-mouth fashion. So far as can be seen, it was not the Clerk who sought the task put upon him of dealing with offers for coal; but that the Provost and some others thought they should come through the Clerk. Again it does not appear that anyone complained that the Commissioners had in any way suffered by the Convener and Manager taking upon themselves the burden of looking out for coal for the gas-works; the subject seemed to be rather brought up on the point of regularity of procedure—a sort of red-tape ground. If this be so, it is probable that what was said was simply in the heat of the moment, and that nothing more will be heard of Mr. Hamilton's retirement from the managership of the works.

Fire at Messrs. George Glover and Co.'s.—Last Saturday, a fire broke out on the premises of Messrs. George Glover and Co., Royal Avenue, Chelsea, which resulted in damage to the ground floor of a building 100 feet long and 60 feet wide, used as workshops, offices, and stores.

Wirksworth and the Ilkeston Water Bill.—By order of the Urban District Council of Wirksworth, a meeting of owners and ratepayers was held at the Town Hall on Wednesday to consider a resolution for opposing the Ilkeston and Heanor Water Bill, by which those towns take the Meerbrook Sough, giving 18 million gallons a day, from Wirksworth, and paying the old Company £6000 as purchase-money. The water has for years run to waste into the Derwent, and the Meerbrook Sough Company is a relic of the old days when lead mining was at the height of its prosperity. Most of the councillors were present, with the Town Surveyor and the Consulting Engineer (Mr. Percy Griffith); and a resolution to oppose the Bill was carried.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 2.

Sulphate of Ammonia.—There has again been a quiet market, and some further decline in values; the closing quotations being £10 15s. to £10 18s. 9d. per ton f.o.b. at the ports. Consumers are still hanging back, there being as yet no indications of an early manure season, and, January contracts being covered, the speculative interest seems to be in no hurry about February requirements. Supplies have been more abundant, and have only been removed at declining prices. No further first-hand business is reported in the forward position; makers' quotations remaining £11 5s. per ton, Beckton terms, London, and £11 7s. 6d., ordinary terms, f.o.b. Leith. There is speculative offering abroad at below the equivalents, and some business is being done, though buyers are shy at anything materially above spot prices.

Nitrate of Soda is steady at 8s. 4½d. to 8s. 7½d. per cwt., according to quality, on spot.

LONDON, *Feb.* 2.

Tar Products.—A somewhat weak market, but with a little more activity than previously, has characterized the past week. There is still difficulty in respect to creosote and tar oils, which are in enormous excess of demand, although the large quantities now being taken up for fuel purposes may adjust the position in the course of time. There is no change in the value of pitch, which is moving off freely on old contracts, and very little new business has been marked. Benzols are slack with less inquiry. Large quantities have gone, and are going, into consumption for gas enrichment. Naphtha is steady, although buyers are trying to get forward business at less money. There is a good demand for carbolic acid, especially for summer delivery.

Market values for the week are: Tar, 13s. 6d. to 17s. Pitch, east coast, 32s.; west coast, 29s. Benzol, 90's, 10d. to 1s.; 50's, 11d. Toluol, 1s. 1d. Crude naphtha, 4½d. Solvent naphtha, 1s. 1d. Heavy naphtha, 1s. Creosote, 1d. Heavy oils, 2d. Carbolic acid, 60's, 2s. 7d. Naphthalene, 90s.; Salts, 60s. Anthracene, nominal, "A," 3d.; "B," 2d.

Sulphate of Ammonia.—The market is undoubtedly dull; and buyers apparently are holding off for lower prices. No great amount of business is noted; but that which has been done has been booked at a lower price. To-day's value is about £10 17s. 6d. per ton, less 3½ per cent., though probably 5s. more can be got for February-April delivery.

The Second Pipe-Line from Thirlmere.—Tenders have been opened by the Water Committee of the Manchester Corporation for the first section of the cast-iron pipes forming the second line of the Thirlmere aqueduct. The weight of the first section is 17,000 tons—rather more than one-fourth of the full quantity that will be required. It is expected that the work of laying the pipes will begin about Whitsuntide; and probably three years will be spent in completing it.

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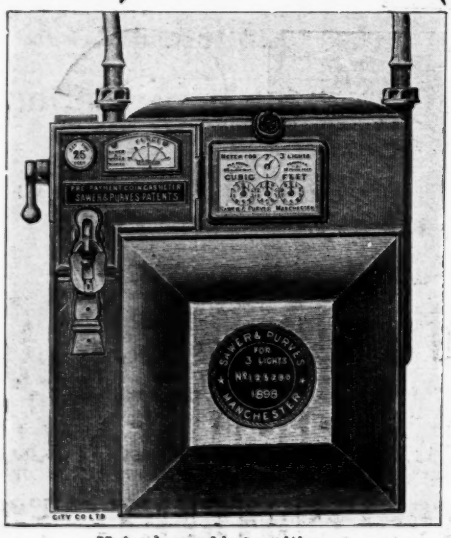

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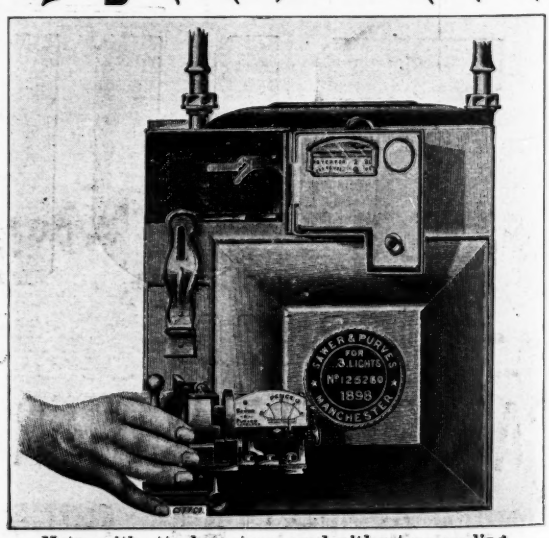

Meter with attachment removed without uncoupling

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—There is still no very material change to report in the position as regards round coal. House-fire requirements continue to take off practically all that pits are raising in qualities suitable for domestic purposes; and for these prices have been well maintained, on the list basis of about 16s. to 17s. per ton at the pit for best Wigan Arley, 14s. 6d. to 15s. 6d. for Pemberton four-feet and seconds Arley, and 13s. 6d. to 14s. for common house coal. In some of the lower descriptions of round coal, the much lessened demand for iron-making purposes, and the quietude in the shipping trade, are beginning to make themselves more and more felt; but at present collieries have no surplus quantities of any weight that they are compelled to push for sale, so that they are still in a position to hold with very general firmness to late rates. At the pit, 12s. to 12s. 6d. per ton still represents about the average price for steam and forge coals, with steam coal for shipment ranging from about 14s. and 14s. 6d. to 15s. 3d., delivered at the ports on the Mersey; but coal from other districts is being offered on the Ship Canal as low as 13s. 6d. per ton. The most seriously threatened break-up in prices just now is in the engine fuel trade, which is more largely affected by the depression in the iron industries and the consequent lessened production of coke. Lancashire coalowners, for the most part, are holding pretty closely to about their quoted rates; but consumers are not placing contracts on the present basis prices—the bulk of the business representing bargain transactions from month to month. The very large users still hold back from settling for the ensuing twelve months' supplies. Lancashire prices remain about 9s. 6d. to 10s. per ton at the pit for the lower qualities, up to 10s. 6d. and 11s. for some special sorts; but under these figures is not infrequently being accepted to prevent business passing into other hands. In the meantime, collieries in the Midlands—especially Derbyshire and Staffordshire—are pushing their slack upon this market at very much below the local quotations; 5s. 6d. to 6s. per ton at the pit representing the prices at which slack in the Midlands can be readily bought. Under these conditions, it is evident that Lancashire collieries can scarcely hope to maintain their present position over any very lengthened period; and meanwhile a good deal of trade that they usually secure in outside markets is being diverted into other districts. For coke, prices are decidedly on the downward move. Good foundry qualities, which still meet with a fairly active demand, are not being reduced more than 2s. with the commencement of the month; 26s. to 28s. at the ovens being about the basis quotations. Furnace qualities, however, for which local makers have been quoting about 20s., are now to be bought at 16s., with common Yorkshire furnace cokes as low as 12s. 6d., and buyers declining to place contracts unless they can do so on the basis of about 10s. at the ovens.

Northern Coal Trade.—The colder weather gave a check to the fall in prices; but there is no recovery, and as the supply is ample the tendency is on the whole still towards ease. It is most apparent, perhaps, in the Northumbrian coal trade, which sends so large a part of its production to markets that are now closed for the winter. Best Northumbrian steam coals are quoted at from 11s. 9d. to 12s. per ton f.o.b., second-class steam coals are 11s., and steam smalls are from 5s. 9d. to 6s. In the gas coal trade there is a better demand, the colder weather enlarging the consumption; but the supply is so great that prices are weak, and best Durham gas coals may be quoted at from 10s. 6d. to 11s. 6d. per ton f.o.b. No additional contracts are reported this week. In the coke trade, the tendency is to weakness. Best Durham coke for export is quoted at from 19s. to 20s. per ton f.o.b. Blast furnace coke is about 15s. 6d. per ton at the Teesside furnaces. Gas coke is naturally affected by the lower quotations just named; and from 15s. to 16s. 6d. per ton f.o.b. is the current price.

Scotch Coal Trade.—A large volume of business continues to be done, at prices which are still receding slightly. Sellers are prepared to contract forward; but buyers are not disposed to pay present prices, though they are greatly less than those ruling a month or two ago. The miners are balloting upon a proposal by the masters to reduce wages by about 1s. per day; and the Conciliation Board are to meet on Friday to consider the reply of the men. A good deal will depend upon how this matter works out. The prices quoted are: Main 10s. 6d. to 10s. 9d. per ton f.o.b. Glasgow, ell 11s. 3d. to 12s. 3d., and splint 12s. to 12s. 3d. The shipments for the week amounted to 156,151 tons—a decrease of 40,096 tons upon the previous week, and of 44,105 tons upon the corresponding week of last year. For the year to date, the total shipments have been 563,169 tons—a decrease of 123,221 tons upon the same period of the previous year.

Gas Profits in Manchester.—Owing to a general expression of opinion on the part of members of the Manchester City Council that as few meetings as possible should be held during the period of national mourning for the death of the Queen, the special meeting of the Council convened for Wednesday last, at which Alderman Gibson's motion respecting the allocation of gas profits was to have been considered, was adjourned; but the matter will probably be brought forward for discussion at the meeting of the Council to-morrow.

Black Country Authorities and the Mond Gas Undertaking.—There seems to be a difference of opinion among the local governing bodies in the Black Country concerning the attitude to be assumed towards the Bill for the supply of Mond gas. Some of the Town Councils, including those of West Bromwich and Smethwick, have already decided to place themselves in a position to oppose the Bill. A proposal has been made for concerted action by those authorities who have gas undertakings of their own. This, however, does not seem likely to be accomplished, as the Rowley Urban District Council are regarding the scheme with considerable favour, while the Oldbury District Council, at their last meeting, appointed a Sub-Committee to meet the promoters, with the view of arranging terms. If these prove satisfactory, their opposition will probably be withdrawn.

The "CZARINA."

SEASON 1900-1.

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Birmingham Gas Committee and the Mond Scheme.—The Gas Committee of the Birmingham Corporation have had under consideration the Bill for the incorporation of the South Staffordshire Mond Gas (Power and Heating) Company. As the area of supply scheduled in the Bill includes Wednesbury, Darlaston, Handsworth, and Perry Barr, which are within the limits of the Birmingham gas undertaking, and the area of the Halesowen Rural District Council, which is partly in that of Birmingham, and as the powers asked for would, if granted, cause an interference with the rights of the Corporation, the Committee have instructed the Town Clerk to take steps to oppose the Bill.

Extraordinary "Leakage" from Penny-in-the-Slot Meters in Birmingham.—The Birmingham Gas Committee report that several cases have recently come to their knowledge where the cash-boxes attached to prepayment meters have been found on the inspector's visit to be empty; the explanation given by the consumers being that the money they had placed in the boxes must have been stolen by some person who had entered the houses and obtained access to the meters without being observed. The Committee have called the attention of the Chief of Police to these thefts; but they are requiring the consumers to pay for the gas consumed on the index registration of the meters, as provided for under the agreements.

Portable Photometer Tests of the London County Council.—On the *agenda* for the meeting of the London County Council to-day, there is a report by the Public Control Committee giving the results of the testings of gas by the portable photometer during the past year. It is stated therein that the number of tests made was 187, of which 131 were under 16 candles; 99 of these, or 53 per cent. of the grand total, being below 15·5 candles. The Committee state that these results show "some improvement in the illuminating power of the gas" as compared with those obtained during 1899. The percentage of testings below 16 candles in that year was 90, whereas in the past twelve months it was only 70. A decided improvement in illuminating power is shown for the second half of the year; the averages of the three Companies being: Gaslight and Coke, 15·9 candles; South Metropolitan, 15·7 candles; and Commercial, 16·8—against 15, 14·2, and 14 candles in the first half. The testings made with the portable photometer in the Commercial Company's district in the past six months show a close agreement with those carried out at the fixed testing-places on the same days; and the Committee say: "These results go to prove that when testings are made at places other than the fixed testing-places, with a portable apparatus of precisely the same character as that in use at the fixed testing-places, and with gas of the same illuminating power, the results obtained outside are in agreement with those obtained within the testing-places."

Workmen's Compensation Act.—A Chester correspondent, who wrote to the Home Secretary, at the request of Mr. Chamberlain, on the subject of the Workmen's Compensation Act, has received the following answer from Mr. J. Pedder, one of the Assistant-Secretaries: "Sir,—In reply to your letter asking whether it is the intention of the Government to remedy the difficulties attending the operation of the Workmen's Compensation Act in the ensuing session, and stating that it is considered scandalous that such an amount of litigation should attend the working of the Act, I am desired by Mr. Ritchie to say that it can hardly be considered unnatural that, out of a measure making a new departure on a subject of great magnitude and complexity, points of difficulty should have arisen which have led to litigation; but many of the most important questions have now been settled by the decision of authoritative Courts, some of which show that several of the hostile criticisms passed at first on the effect of the Act were not well founded. Reference may be made in particular to two or three recent judgments of the House of Lords. Also it should not be forgotten that, while the cases of litigation attract notice, the number of workmen who obtain the benefits of the Act without dispute is almost immeasurably greater. Mr. Ritchie is taking note of the points in which it may prove that the Act requires amendment, and all the questions which have arisen on it are receiving the very careful consideration of the Government. But it is not possible to make any promise as to legislation next session."

The following contracts have been entered into in connection with the extensions which are being carried out by the Colne Valley Water Company: Beamengine, Messrs. J. Simpson and Co.; well and heading, Messrs. T. Docwra and Son; new mains, John Aird and Sons.

It is gratifying to know that this year the revenue of the Teesside Water Board will be sufficient to pay the interest and redemption on the loan capital of the various Corporations. This will mean a substantial reduction in the rates of the three towns of Middlesbrough, Stockton, and Thornaby.

The Cory-Miller Patent Fuel Syndicate, Limited, has been registered with a capital of £10,000, in £1 shares, to acquire certain patents relating to an invention known as the Cory-Miller fuel, and to carry on the business of artificial or smokeless fuel manufacturers, coal miners and merchants, coke, ammonia, tar, gas, and bye-products manufacturers and merchants, &c.

In their first balance-sheet, the Directors of the National Gas-Engine Company state that they propose to pay a dividend at the rate of 5½ per cent. on the preference shares, and 5 per cent. on the ordinary shares for the six months ending Dec. 31. This will absorb £4601, and leave a balance of £9274. Out of this the Directors propose to place £7000 to a special reserve fund, and to carry forward £2274.

For three days in the week ending the 25th ult., an exhibition of gas-stoves was held by the Gaslight and Coke Company in the Assembly Rooms, Defoe Road, in their Stoke Newington district. The stoves shown were the various kinds made by Messrs. Richmond and Co., Limited. Miss Hodges, with the aid of an assistant, gave cookery demonstrations, and offered some useful hints as to ensuring the greatest economy from the appliances exhibited.

The profit-sharing system adopted by the Thames Iron-Works Company has proved to be a great success. It is reported that a sum of more than £50,000 has been paid as bonus to the workmen above the standard rates of wages in the several departments. The Manager (Mr. A. F. Hills) states that the eight-hour day has been a success. The bonus is calculated on the completed contracts; all profits above the minimum tenders being divided between the Company and the employees.

The Secretary of State for Foreign Affairs has received a dispatch from His Majesty's Consul at Amsterdam, stating that tenders are invited by the Ministry for the Colonies at The Hague, not later than the 27th prox., at noon, for the supply at their Technical Bureau of about 3600 tons of asphalted cast-iron flange pipes for the water-works at Surabaya (Java). Particulars, either in Dutch or in English, can be obtained from Martinus Nyhoff, bookseller, The Hague, at a cost of 2fl. 50c. (4s. 2d.) for each copy.

A water-waste preventer has been introduced by Messrs. Ham, Baker, and Co., of Grosvenor Road, Westminster. It will only deliver a certain quantity—the contents of a cylinder—even when the tap is left full on. To get more, the tap has to be turned in the opposite direction, when another cylinder full of water can be drawn, and so on. The device comprises a cylinder with a piston in it, and a three-way cock. By the cock the pressure water is turned into one end of the cylinder, forcing the piston before it, and driving out the water from the other end. On reversing the cock, the pressure is diverted to the now empty part of the cylinder, and the full part is exhausted.

The "Daily Express" says that "the British tube and wrought-pipe combine is making a determined stand against American competition, which is becoming disastrous. Again and again prices have been reduced in order to keep the home trade, and now, as a last resort, a new 5 per cent. discount upon the lowest prices yet quoted is announced. To secure this discount, the purchasers must agree to buy exclusively from British mills, to keep up the Association's price list, and to buy not less than £150 worth of goods by June 30." Our enterprising young contemporary states that Mr. George D. Wick, of Youngstown (Ohio), is in England with an engineer studying the new processes for pipe and tube making, with a view to establishing plant to fight the American Trust which has absorbed his business. It is reported that he will be aided by British capital.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

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Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, see p. 312.]

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BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

OXIDE OF IRON OF FINEST QUALITY.

BALE'S Special Fire Cement should be used to keep Retorts, Furnaces, &c., in good repair during the heavy Winter Work.

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Information and Handbook on application.
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THE Bristol Water-Works Company re- quire an ASSISTANT SECRETARY (whose age must not exceed 35 Years) of good executive Ability and Experience. Salary commencing at £300 a year.
Applications, endorsed "Assistant Secretaryship," accompanied by *copies* of Testimonials, should be made in writing, not later than the 8th of February next, to the undersigned, and should state Age, Experience, General Qualifications, and present and past Employment.
Canvassing not permitted.
By order,
(Signed) ALFRED J. ALEXANDER,
Secretary and General Manager.
Small Street, Bristol.

WANTED, an energetic and capable MAN, to take CARE OF, AND MANAGE, COKE-OVENS, where Bye-Products are collected. He must have had experience with Fire-Brick Work and the Lining of Ovens. He must also thoroughly understand the Manufacture of Sulphate of Ammonia and Benzol, and have a fair knowledge of General Engineering. The Plant will be entirely placed under his charge; and he will be responsible for the results obtained. The applicant will be expected to superintend the tests for Waste, &c., that are made daily.
Salary £250 a Year, and a Bonus on the result.
Only those who have had actual experience, and can give undeniable References, need expect a reply to the application.
Address No. 3631, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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WANTED, for the Waterford Gas- Works, by June next, a set of new or Second-hand PURIFIERS with Connections (square or oblong), each about 250 feet super. Lutes at least 18 inches deep.
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J. F. BLAKELEY Gas Engineer, Thornhill, DEWSBURY.

FOR SALE—Trammel of good design, suitable for Tank, 150 feet diameter.
For Particulars, apply to HOLME & KING, LIMITED, Calder Vale Road, WAKEFIELD.

THE Moreton-in-Marsh Gas and Coke Company, Limited, have several Barrels of TAR and AMMONIA WATER to dispose of weekly.
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ONE Exhauster and Engine complete and One EXHAUSTER only (12,000 cubic feet per hour each) FOR SALE at the Gas-Works, St. Mary Cray, Kent.
Apply to W. B. MIMMACK, Manager and Secretary.

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Apply to J. & H. ROBUS, 20, Buckersbury, LONDON, E.C.

THE Corporation of Liverpool have for DISPOSAL a large number of modern 14-inch square Lamps, Copper built throughout, with plain Glass sides, and Opal Glass top, for use in Cradles or on Legs. They are in good repair; a large number of them being practically equal to new.
A sample will be sent on application. Price 7s. 6d. each at the Stores, Hood Street.
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BICESTER GAS-WORKS.

THE Directors of the Bicester Gas, Coke, and Coal Company invite TENDERS for taking the WORKS ON LEASE for the term of Seven Years from the 25th day of March, 1901.
Applicants are requested to apply to me at my Office in Bicester, Oxon, for the Terms of Letting; and sealed Tenders, subject to such Terms, are to be delivered to me on or before the 25th day of February, 1901.
The Directors do not pledge themselves to accept the highest or any Tender.
By order,
GORDEN WALSH,
Secretary.
Bicester, Oxon,
Jan. 28, 1901.

PORT ERIN AND PORT ST. MARY GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the CAST-IRON and STEEL WORK required in the construction and erection of a GASHOLDER TANK, 62 feet in diameter and 18 ft. 9 in. deep, a SINGLE-LIFT GAS-HOLDER, with Guide-Framing, Inlet and Outlet Pipes, and the necessary Foundations.
Further Particulars and a copy of the Bill of Quantities may be obtained from Messrs. Thomas Newbigging and Son, Engineers, 5, Norfolk Street, Manchester, on deposit of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.
Tenders to be sent so as to reach me not later than noon on the 16th day of February, 1901.
The lowest or any Tender not necessarily accepted.
JOHN MOORE, jun.,
Secretary.
Port St. Mary, Isle of Man,
Jan. 26, 1901.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Bell Hotel, Bromley, Kent, on Thursday, the 14th day of February, at Six o'clock p.m. precisely, to receive the Report of the Directors, the Balance-Sheet certified by the Auditors, to declare a Dividend, and for General Purposes.
The TRANSFER BOOKS WILL BE CLOSED from the 1st to the 14th of February, both days inclusive.
By order of the Board,
HENRY W. AMOS,
Secretary.
Offices: At the Works,
Bromley, Kent, Jan. 30, 1901.

GLASGOW CORPORATION.
(GAS DEPARTMENT.)

NEW PROVAN GAS-WORKS.
(CONTRACT No. 4.)

THE Corporation invite Tenders for the IRON and STEEL WORK of ROOFS, GIRDERS, &c., required in the construction of the Retort-House and Coal-Store at their new Provan Gas-Works.
The Plans and Drawings may be seen, and Copies of the Specification, Table of Quantities, and Form of Tender obtained, upon application to Mr. W. Foulis, the Engineer, at his Office, 45, John Street, Glasgow, upon payment of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.
Sealed Offers, endorsed "Gas Department, New Provan Gas-Works," must be lodged with the Subscriber on or before Monday, the 25th of February next.
All Offers must remain open for a period of Thirty Days from the date thereof; and the Corporation do not bind themselves to accept the lowest or any Offer.
J. D. MARWICK,
Town Clerk.
City Chambers, Glasgow,
Jan. 29, 1901.

COLNEY HATCH GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, 5, Great Winchester Street, Old Broad Street, London, E.C., on Thursday, the 21st day of February inst., at Five o'clock in the Evening precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 31st of December, 1900, to declare Dividends, to elect Directors, to appoint an Auditor, and for other purposes.
By order,
ERNEST L. BURTON,
Secretary.
Secretary's Offices:
5, Great Winchester Street,
London, E.C., Jan. 31, 1901.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Shareholders of the above Company will be held at the Offices of the Company, No. 30, Gracechurch Street, in the City of London, on Friday, the 22nd day of February, 1901, at Three o'clock in the Afternoon, to receive the Report of the Directors and the Accounts for the Half Year ended the 31st day of December last, to declare a Dividend, to elect a Director and an Auditor in the place of those retiring by rotation, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 9th to the 22nd inst., both inclusive.
By order of the Board,
ERNEST W. DREW,
Secretary.
Offices: 30, Gracechurch Street,
London, Feb. 1, 1901.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Albion Tavern, Aldersgate Street, in the City of London, on Friday, the 22nd day of February, 1901, at Half-past Twelve o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 31st day of December last, to declare a Dividend, to elect Directors in the place of those retiring by rotation, to elect an Auditor in the place of Mr. A. G. Hounsham deceased, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 9th to the 22nd of February, both inclusive.
By order of the Board,
ERNEST W. DREW,
Secretary.
Offices: 30, Gracechurch Street,
London, Feb. 1, 1901.

BARNSTAPLE GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of the above Company will be held at the Bridge Hall, Barnstaple, on Saturday, the 16th day of February, 1901, at Twelve o'clock at noon, to receive the Report of the Directors, and the Accounts for the Fifteen Months ended the 31st day of December last, to declare a Dividend, to elect a Director and an Auditor, to consider and determine as to the grant of a retiring allowance to Mr. Richard Ashton, and to transact the General Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 2nd to the 16th of February, both days inclusive.
By order of the Board,
F. L. SCHOFIELD,
Secretary.
Offices: 79, Boutport Street,
Barnstaple, Jan. 29, 1901.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, Willoughby Lane, Tottenham, on Saturday, the 23rd day of February inst., at Half-past Three o'clock in the Afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 31st day of December, 1900, to declare Dividends, and transact such other Business as the Act of Parliament directs.
The TRANSFER BOOKS for the CONSOLIDATED "A" and "B" Stocks WILL BE CLOSED from Friday, the 8th inst., to Monday, the 25th inst., both days inclusive.
By order of the Board of Directors,
JAMES RANDALL,
Secretary.
Offices of the Company:
Willoughby Lane, Tottenham,
Feb. 1, 1901.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is Hereby Given, that an EXTRAORDINARY MEETING OF THE PROPRIETORS OF THE SOUTH METROPOLITAN GAS COMPANY will be held at the Cannon Street Hotel, in the City of London, on Wednesday, the 13th day of February next, at 2.30 o'clock in the afternoon, or so soon thereafter as the business of the ORDINARY MEETING of the Proprietors shall be concluded, for the purpose of considering the Provisions of the Bill now before Parliament, intituled "A Bill to Empower the South Metropolitan Gas Company to Raise Additional Capital, and to Purchase by Agreement so much of the Southern Portion of the Undertaking of the Gaslight and Coke Company as is Situate in the County of London, South of the Thames, and for other Purposes."

At such Meeting, the said Bill will be submitted for the consideration and approval of the Proprietors.

Dated this 26th day of January, 1901.

By order,
FRANK BUSH,
Secretary.

Offices: 709A, Old Kent Road, S.E.

CRYSTAL PALACE DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Albion Tavern, Aldersgate Street, London, E.C., on Friday, the 15th day of February, 1901, at Three o'clock in the afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 31st day of December last, to declare a Dividend for the same period, to elect two Directors and one Auditor in the place of those retiring by rotation, and one Auditor in the place of Mr. A. G. Hounsham, deceased, and for General Purposes.

The TRANSFER BOOKS WILL BE CLOSED from the 1st day of February, until after the Meeting.

By order of the Board,
CHARLES M. QHREN,
Secretary.

Offices and Works:
Lower Sydenham, S.E.,
Jan. 31, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

SUNDERLAND AND SOUTH SHIELDS WATER COMPANY.

IMPORTANT SALE
OF
WATER STOCK.

TO BE SOLD by Auction in the Long Room of the Queen's Hotel, Fawcett Street, Sunderland, on Thursday, the 21st of February, 1901, at Two o'clock in the Afternoon prompt,

MR. ATKINSON GIBSON, AUCTIONEER,
£15,000

(Nominal) of the NEW STOCK (Maximum Dividend 5 per cent.) authorized to be created and issued under the powers contained in the Sunderland and South Shields Water Act, 1891.

The above Stock will be entitled to Dividend from the 1st day of January, 1901, and be registered in the name of the Purchaser free of charge.

A Deposit of 10 per cent. will be required at the time of Sale; the remainder to be paid on or before the 1st day of March, 1901.

BOURNEMOUTH GAS AND WATER COMPANY.

ISSUE OF SIX PER CENT. PREFERENCE SHARES.

Sale by Tender of 1000 SIX PER CENT. PREFERENCE SHARES, in pursuance of the Provisions of the Bournemouth Gas and Water Act, 1896.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER 1000 PREFERENCE SHARES of £10 each (the Dividend on which is limited to £6 per cent), to be paid up in full on or before the 28th of February, 1901.

Particulars and Conditions of Tender may be obtained at the Company's Offices, Bournemouth, or of the Secretary, as under.

Sealed Tenders must be sent to the Secretary not later than Eleven o'clock on Friday morning, the 15th of February, 1901.

By order,
WILLIAM CASH,
Secretary.

London: 90, Cannon Street, E.C.,
January, 1901.

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The explanatory remarks are given in language that cannot be misunderstood.—*Leeds Mercury.*

We can confidently recommend this work to Accountants' students, and to practitioners desiring a reliable work on the system of book-keeping, most suitable for the accounts of Gas Companies.—*Accountants' Journal.*

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Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

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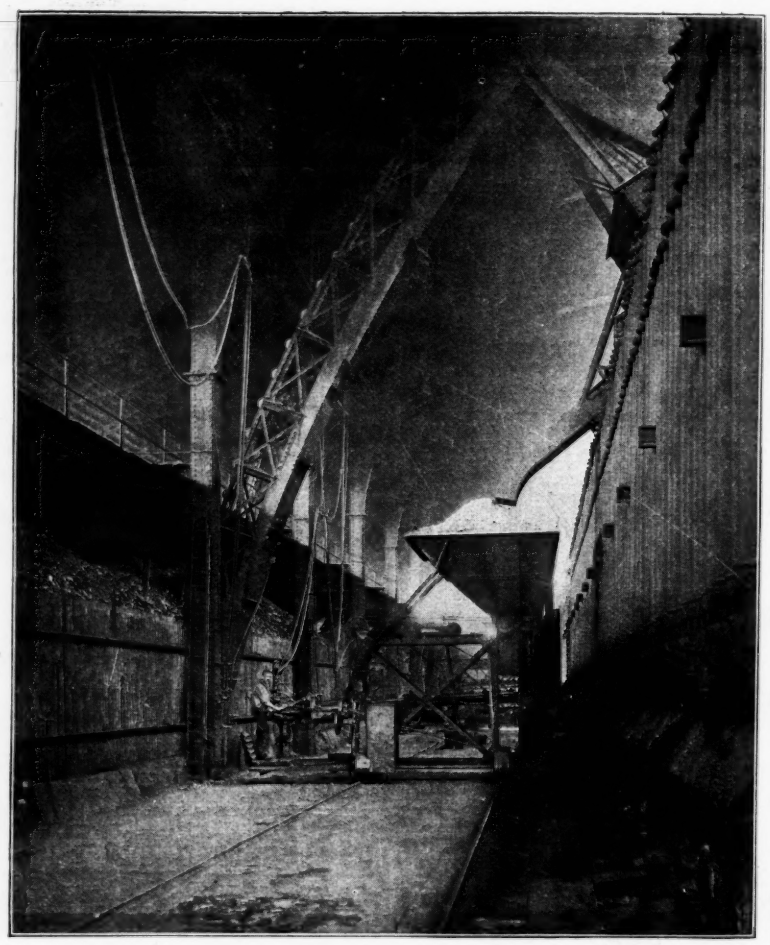

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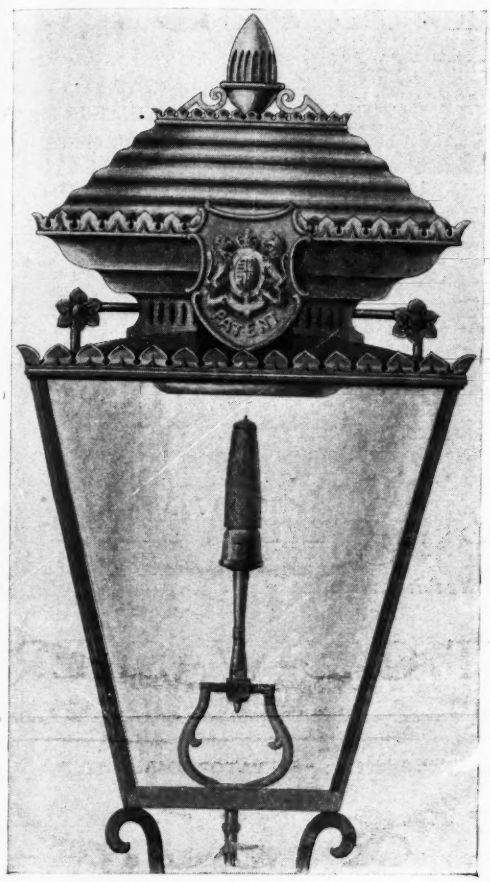

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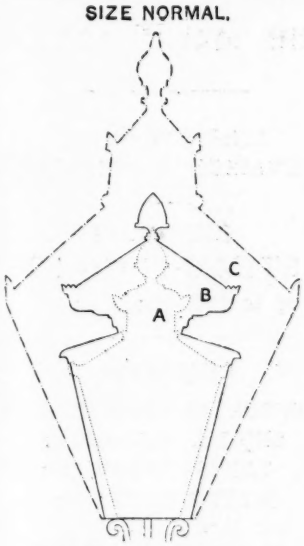

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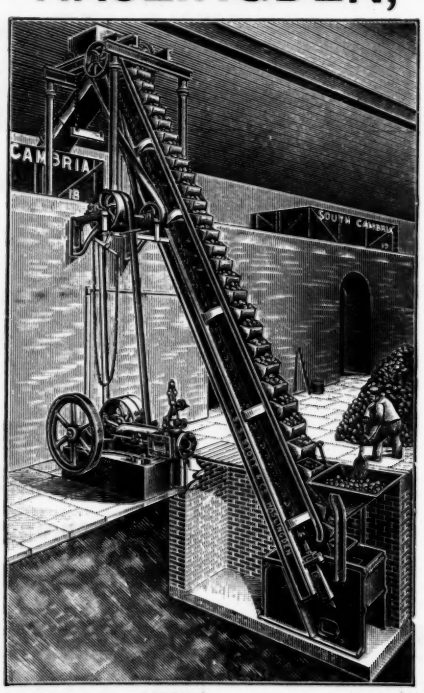

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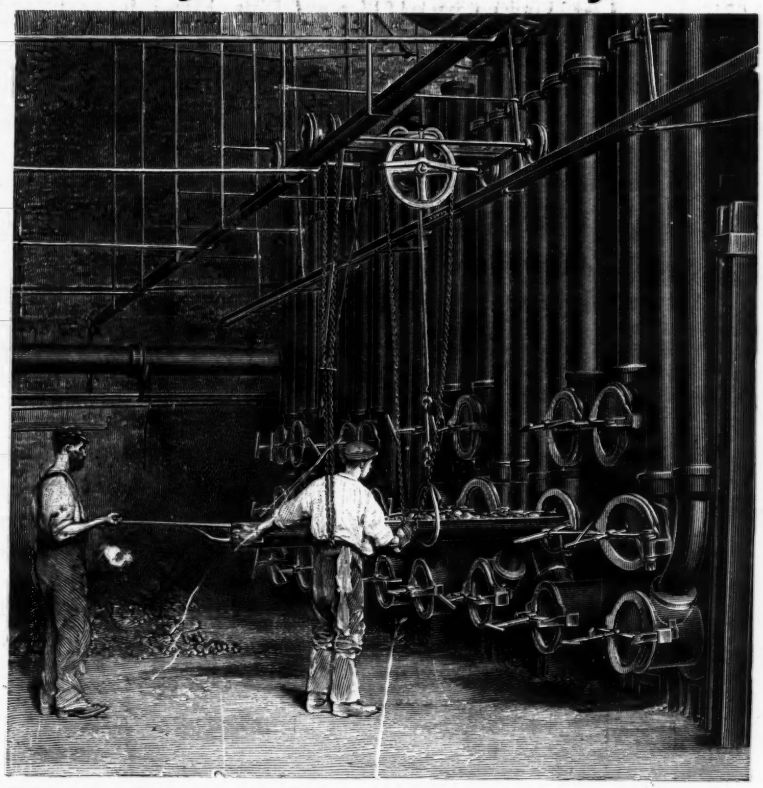

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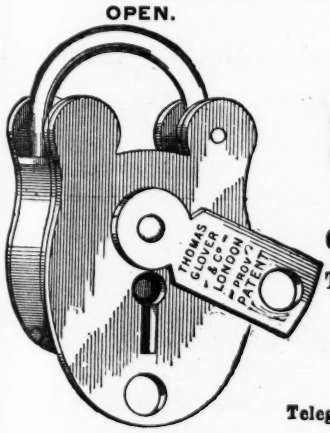

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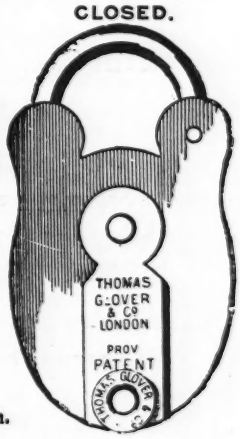

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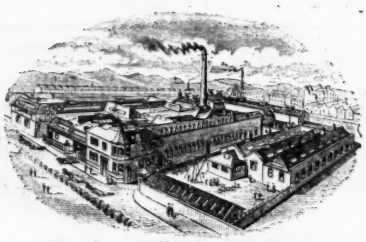

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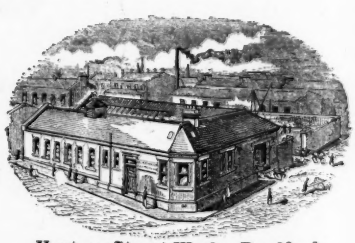

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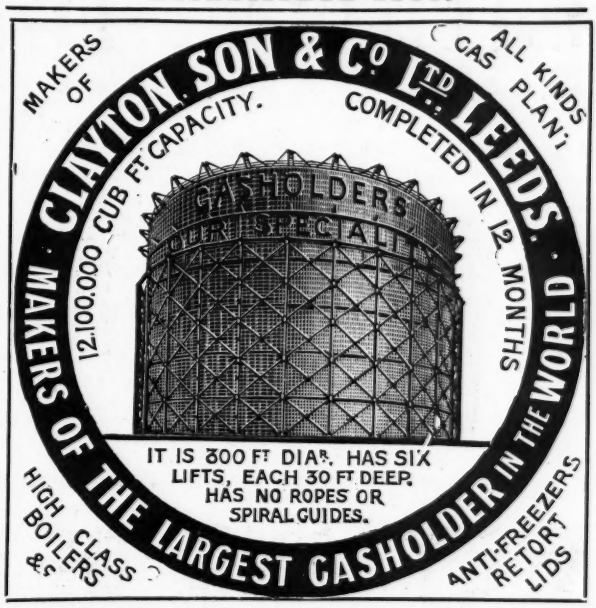
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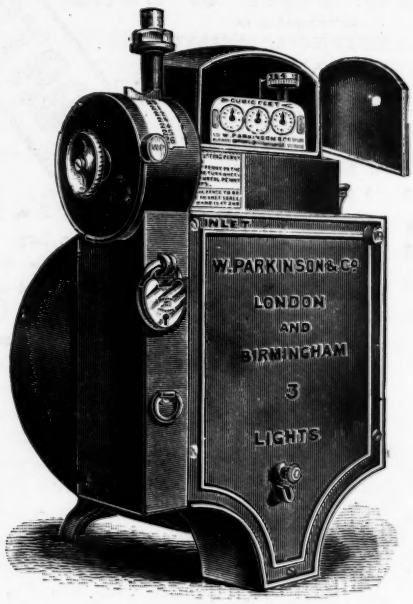

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[See also Advt. p. 318.

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